THE

TEACHERS' AND PUPILS'

CYCLOPÆDIA

A Popular Dictionary

OF

GEOGRAPHY, BIOGRAPHY, HISTORY, LITERATURE, ECONOMICS
CIVICS, ARTS, SCIENCES, DISCOVERIES
AND INVENTIONS

PROFUSELY ILLUSTRATED

EDITED BY
B. P. HOLST, M. A.
TEACHER AND SCHOOL SUPERINTENDENT

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EMBER DAYS, certain days in each of the four seasons set apart for prayer and fasting, one theme for supplication being that the blessings of God may descend on the crops. They are the Wednesday, Friday, and Saturday after the first Sunday in Lent, the feast of Pentecost, the 14th of September, and the 13th of December.

EMBROIDERY (ĕm-broid'ẽr-ў), the name applied to ornamental needlework produced upon fabrics of any kind. Its production was one of the most important of the early arts in oriental countries, and it is still practiced with much skill and diligence, the best work being done upon silk. The figures are either in colored silk or in threads of silver and gold. They consist of men, horses, dragons, etc., and are outlined with gold and filled with shades of silk, though sometimes ornamented with beads, spangles, pearls, and precious stones. The fabric is stretched usually on a frame, with the design to be worked drawn upon it, or some other contrivance is used to guide the worker. From the earliest times embroidery was used to decorate the sacerdotal vestments, but it also served other ecclesiastical uses. The Jews derived their skill in producing embroidery from the Egyptians. It appears to have been a common art, since even barbarous tribes were skilled in its production and delighted in its use. Many of the nomadic tribes of Asia and Africa still practice it as a domestic art. Modern nations manufacture embroidery by elaborate machinery.

EMBRYOLOGY (ĕm-brĭ-ŏl'ŏ-gў), that branch of biology which treats of the formation of organisms. The study of this division of learning as a science dates only from the last century, though Aristotle, Galen, and Harvey considered the subject and laid the foundation for the recent embryologists. Among the most eminent productions of recent writers are "Evolution," written by Darwin; lectures on "Comparative Embryology," by Agassiz, and the well known "German Text-book on Embryology," published by Korscheldt and Heider in 1899. The epoch of life in placental mammals, to which the study of embryology ordinarily is limited, extends from conception to the period at which the anatomical connection between the young and mother is severed, though in a general sense it extends from conception to the attainment of the perfect form. Besides, in animal embryology there are radical distinctions that give rise to divers limitations.

In most fishes and some other animals the embryo and parent have no anatomical connection, while fertilization of the ovum in many of these is effected outside the female. In oviparous animals the female retains the ovum within the body for some time after fecundation, where it exists independent of the maternal body, though securing from it heat and protection. After a definite number of eggs have been ejected, the mother begins external incubation, which is continued until the young life bursts from the shell. However, a filial relationship exists after incubation by reason of which the new life is supplied with protection and food, while in other animals the lacteal function of the mother supplies the helpless young with support quite as vital as the nourishment previously extended through the placenta.

The laws announced by Rudolf Virchow (q. v.) and Karl Ernst von Baer (1792-1876), two German scholars, form the basis of study in modern embryology. The laws of the former imply that the organs and cells of new life forms originate primarily from cells deposited in the ovulum and gradually become complex through cell division and cell specialization, or physiological division of labor. Von Baer's law maintains that the form primarily assumed by an individual in the process of development is similar to that assumed by many types; later its organism becomes more specialized and, when fully developed, stands wholly apart from parallel types. Thus, the process of development leads to the special from the general, to the heterogeneous from the homogeneous.

Herbst explains the whole process of embryonic development by asserting that the protoplasm responds in a very intricate way to its surroundings; that it depends upon physiological responses to stimulations that come from without; in other words, that the cells and organs in the embryo move and change form in response to various stimuli, especially in eggs containing a considerable quantity of yolk. The yolk being food for the embryo, it is certain that the latter gives off waste products in the process of rapid growth, and later moves away to portions of the yolk not contaminated by such wastes. It is quite well known that the development of the embryo differs materially in different animals, though in the successive stages there is much analogy, even in the human fœtus, to the embryo or adult of the lower life forms. However, in this connection arises the discussion of the theories of evolution and epigenesis. According to the former theory the embryo exists pre-formed in the ovum and begins to unfold into the adult as soon as fecundation takes place; while in the latter we find the theory that holds the growth of the embryo to be a process of new formation, the cell mass giving birth to new cells in their own interior by stimulation from without, a view now most generally adopted.

EMERALD (ĕm'ẽr-ạld), a variety of beryl, being distinguished in having an emerald-green color, in place of pale green, light blue, yellow, or white hues, which are the colors of the beryl. The emerald-green of this gem is produced by the presence of chromium. Jewelers obtain the finest emeralds from Peru, but fine varieties also occur in other places of South America, and an inferior quality is native to Europe. The

emerald is usually in the form of a prism, and is most valuable when the surface is perfectly straight and smooth, so as to cast no darkening shadow on any of its particles. It is one of the softest of the precious stones, but acids will not affect it. Emeralds are cut on a copper wheel with emery dust, and polished on a tin wheel with rotten-stone. As a gem it is considered inferior only to the diamond and ruby.

EMERSON (ĕm'ẹr-sọn), **Ralph Waldo**, celebrated essayist, philosopher and poet, born in Boston, Mass., May 25, 1803; died April 27, 1882. He came from a family that resided in America for three generations, graduated at Harvard College in 1821, and later studied theology under the direction of Channing. Soon after he was made pastor of the Second Unitarian Church, Boston, but severed his connection after a brief period on account of holding views respecting the Lord's Supper at variance with his congregation, and afterwards devoted himself to writing and lecturing. He married in 1830, but his wife died the following year, and he spent two years in Europe, largely with the view of recuperating his own health. While in Britain he became acquainted with Wordsworth, De Quincey, Coleridge, and Carlyle, forming with the latter a personal friendship that influenced the lives of both. In 1835 he married again and settled in Concord, Mass., where he made his permanent home, leaving it only when on lecturing tours and for a second visit to Europe. His life was largely that of a literary recluse, owing to the close attention he gave to study and research. His knowledge of the practical affairs of public life was comparatively limited, though he possessed considerable interest in public questions, while his philosophy lacked robustness and thought, at least such as the busy life of his time required. His essays are characterized by charming ideals and ethical beauty. These, together with a wise choice of words, originality in thought, and inspiring tendency, have made for them a permanent place in modern literature. The total collection of Emerson's works embraces twelve volumes, including philosophical and religious writings, poems, essays, and lectures, the latter embracing several on the abolition of slavery. Among his best-known and popular writings are "Representative Men;" "American Scholar;" "Memoir of Margaret Fuller;" "Oration on the Death ot Lincoln;" "Society in Solitude;" "Conduct of Life;" "Nature: An Essay;" "Letters and Social Aims;" "May Day and Other Pieces," and "English Traits." With these should also be classed "Letters to Thomas Carlyle," a series of letters published posthumously.

RALPH WALDO EMERSON.

EMERY (ĕm'ẽr-ỹ), a variety of corundum, being allied to the sapphires, the ruby, and other precious stones. It is granular in texture and the hardest substance found native, next to the diamond. Emery is a dense, opaque, dull grayish-black substance occurring in bowlder like masses, and as granulates in soils. It is found in the islands of the Greek Archipelago, in Asia Minor, at Chester, Mass., and elsewhere. As a powder it is used extensively for cutting and polishing precious stones, and smoothing the surfaces of lenses and plate glass. When employed in this form, it is prepared by first breaking the stone into small lumps, then crushing them into powder by stampers. Emery-paper and emery-cloth are made by sifting the powder over strong sheets of paper or cloth, after brushing them with liquid glue. Emery-wheels are commonly made of wood covered with leather or coarse cloth, with a surface of emery, or a compound of emery and caoutchouc molded into the shape of a grindstone and vulcanized.

EMIGRATION (ĕm-ĭ-grā'shŭn), the removal from one country or region for the purpose of settling or residing in another. Inhabitants leaving a country are called emigrants, while those coming into a country or state are spoken of as immigrants. Among the principal causes that have led to emigration are over-population, political and social discontent, compulsory military service, religious persecution, the desire to attain greater liberty, and the general betterment of industrial conditions. The barbaric tribes of ancient times were led to emigrate and occupy territory more conducive to their arts of warfare and life, while civilized people have migrated more or less for higher purposes, especially to carry civilization and religious benefits to remote lands. All of Europe was settled by the over-population that pressed westward from Asia, and later, when the population of European countries became dense, the inhabitants in turn sought newer lands and greater opportunities. The fact that people are governed by certain laws of migration, such as passing to countries having a similar climate, natural resources, or altitude, has been well established.

Emigration to America on a large scale began with the departure of the Puritans, who planted colonies in New England. Soon after the Dutch colonized New York, the Germans settled Pennsylvania, the French Canada and Louisiana, the Spaniards Florida, and the Swedes Delaware. In 1815 such an extensive breaking-up occurred in Europe that alarm was occasioned, though afterwards it became manifest that the emigrants

were made up largely of the over-population of various countries. The last century marks the greatest epoch of migration in the world's history, a period in which the Spanish and Portuguese languages were planted in Central and South America, the English in North America and Australia, and the Dutch, English, German, and French in various portions of Africa, Asia, and the Oceanic islands. Perhaps, the planting of language is even overshadowed by the establishment of certain forms of religion, industries, customs, and the molding of a new civilization. The colonial policy pursued in recent years by the great powers of Europe is tending to direct the over-population to various colonies, and thereby to strengthen more and more the foothold that these nations have in regions far remote from the mother country. This is particularly true of the Russians in Asia, and the Portuguese, French, Germans, English, and Italians in Africa.

EMIN PASHA, African traveler, whose real name was Eduard Schnitzer, born at Oppeln, Germany, in 1840; slain Oct. 20, 1892. He was educated at Neisse, studied medicine in Berlin, and went to Turkey in 1864, where he became successful as a physician. After learning Arabic and Turkish, he adopted Turkish habits and customs, and assumed the name of Emin, meaning the "Faithful One." Later he accompanied Hakki Pasha on official expeditions through Armenia, Syria, and Arabia, became attached to Ismail, governor of Scutari, and, after the death of the latter, married his widow. He joined the Egyptian service as chief physician in 1876, and two years later was appointed governor of a province by General Gordon. Soon after the troops of the Mahdi cut his communication and surrounded his forces, though he defended himself until an expedition under Stanley came to his relief in the spring of 1888. The following year he was taken prisoner by the natives, but escaped and entered the German service. In 1892 he undertook an expedition to the Congo, where he was captured and murdered. Many European countries bestowed distinguished honors upon him for valuable services in African research.

EMINENT DOMAIN (ĕm'ĭ-nẹnt dō-mān'), the supreme right possessed by a country or state to take or control private property for public use without the consent of the owner. This right is justified in the United States in that it serves to promote the general welfare, but the fifth amendment of the constitution requires that full and adequate compensation be made to the owner. The construction of railroads, canals, public highways, and buildings make it necessary to recognize this right, though its exercise is wisely guarded by state legislatures and the national congress.

EMMET (ĕm-et), **Robert**, revolutionist, born in Dublin, Ireland, in 1780; executed Sept. 20, 1803. At the age of fifteen years he entered Trinity College, Dublin, where he was a fellow of Thomas Moore, the poet, and was expelled in 1798 on account of having connected himself with the Association of United Irishmen. Soon after he traveled in Europe, consulted with Tallyrand and Napoleon regarding the Irish cause, and planned a general revolution, devoting his own fortune of $15,000 for the purchase of munitions of war. He attempted to seize the arsenal and castle of Dublin on July 23, 1803, but the attempt failed, his men dispersing after the first volley had been fired. He escaped in safety to the Wicklow Mountains, but, contrary to the advice of his friends, he insisted on visiting Sarah Curran, daughter of the celebrated barrister, and was apprehended. The speech made in his own behalf at the trial on the charge of high treason is remarkable on account of its eloquence, though he was convicted and hanged. Thomas Moore commemorated his fate by writing "O, Breathe Not His Name," while he perpetuated the memory of Miss Curran, who died in Sicily soon after Emmet's execution, by writing "She is Far from the Land Where Her Young Hero Sleeps."

EMMETT, Daniel D., musician and author, born in Mt. Vernon, Ohio, Oct. 29, 1815. He descended from a family prominent in American patriotism, his grandfather having served in the Revolutionary War, and his father in that of 1812. He learned to play the violin at an early age, became accomplished on several instruments, and acted with a number of minstrel troops. In 1859 he composed the celebrated song, "Dixie Land," which, during the Civil War, attained a popularity among the Confederates equaled only by "John Brown's Body" among the northern soldiers. This famous air is as popular now as when it was written, and touches the emotions in foreign lands quite as effectually as on the American continent.

EMOTIONS (ĕ-mō'shŭns). See **Feelings**.

EMPIRICISM (ĕm-pĭr'ĭ-sĭz'm), a system of practice based on the results of observation rather than on scientific investigation of principles. It is evident from the very nature of progress in the learned professions that the early methods employed were more largely empirical than after material advancement had been made, though the value of any system of learning depends to a large extent upon practical observations based upon successful and continuous experiments. In the greater activities of modern civilization scholars aim to take advantage of every useful discovery and method made in previous ages, and, by a system of continuous investigation, to supplement such newer and advancing methods as are evolved in consequence of thorough application. From this it is evident that all methods are to take into account the benefits of systems originated in the past, and to further accumulate

and enlarge by experience and observation.

EMPORIA (ĕm-pō′rĭ-ą), county seat of Lyon county, Kansas, on the Neosho River, 120 miles southwest of Kansas City. It is surrounded by an excellent farming country, has numerous railroads, electric and gas lights, waterworks, and a sewerage system. The manufactures include vehicles, ironware, canned goods, flour, dairy products, and works in marble. It has a fine school system, is the seat of Emporia College, and of a state normal school. Population, 1900, 8,223.

EMS, usually called the Bath of Ems, a bathing place of Germany, about four miles from Coblentz, on the Lahn River, in the province of Hesse-Nassau. Its thermal springs belong to the class containing soda; their waters are used both for drinking and bathing. There are numerous bathing establishments, many of which are finely constructed. The town also has excellent hotels and private lodging houses. Thousands of visitors throng the place annually. The population of Ems is 7,981.

EMU, a large bird closely allied to the cassowary, standing from five to six feet high; native to Australia and the adjacent islands. Its color is a dull brown mottled

EMU.

with gray-white; the young are striped with black. The head is devoid of a helmet, as found in the cassowary, and the bill is depressed. Australian natives value the flesh and eggs for food; the former has a taste resembling that of beef. Emus are easily domesticated and breed readily in that state. The eggs are not as large as those of the ostrich, being only about four inches in diameter, but require three months for incubation, which is sometimes performed by the male. They live on roots, fruits, and herbage. The only sound uttered is a loud, booming cry made by the female. This species of birds is unable to fly, but it possesses much speed in running.

EMULSION (ē-mŭl′shŭn), a medical preparation composed of a soft liquid resembling milk in consistency and color, its oily or resinous property being united with water by a saccharine or mucilaginous substance. Among the best known is the emulsion of cod liver oil, used in treating pulmonary disease.

ENAMEL (ĕn-ăm′ĕl), the name given to vitrified substances of various composition, applied to the surface of metals. It is generally put on like paint, with a brush, and then heated sufficiently to melt the enamel, which causes it to become a fixed part of the surface. The art was practiced by the Egyptians and Etruscans on pottery, and passed from them to the Greeks and Romans. In western Europe, especially among the Saxons and Normans, it was early employed in manufactures. It is used for producing artistic designs, figures, and ornaments, when it belongs to the fine arts; also for making the dial-plates of watches and clocks, and for coating culinary vessels. The basis of all enamels must be an easily fusible, colorless silicate or glass. All bases on which it is applied must be cleaned with weak acid or some similar preparation, and moistened with gum-water. Copper is the best base, but iron is used for ordinary purposes.

ENAREA (ĕn-ą′rĭ-ą), a region of Africa, situated south of Abyssinia, and inhabited by a portion of the Gallas tribes. The government is a hereditary and absolute monarchy; the productions, coffee, cloth, embroidery, gold, live-stock, and fruits. In religion the people are largely Mohammedan, and the slave trade is still sanctioned, though it has been abridged greatly in recent years. The government is administered from Saka, a city near the Gibbe River.

ENCYCLOPÆDIA (ĕn-sī-klŏ-pē′dĭ-ą), **Encyclopedia**, or **Cyclopædia**, a work in which the various branches of science and art are treated separately, or in particular departments, and usually in alphabetical order. The authors of early encyclopædias attempted to treat all subjects of human knowledge exhaustively, but, as knowledge extended, vocabularies enlarged, and specialists multiplied it became necessary to confine the treatise to a smaller limit of subjects or make the work departmental and specialized. It is assumed that Terentius Varro wrote the first extensive work of an encyclopædic nature in the year 30 B. C. Pliny the Elder soon after prepared his well known "Natural History," which long ranked as a highly superior work. Farabi, an Arabian writer, prepared an encyclopædia in the Arabian in the 10th century, while Dominican Vincent of Beauvais, under the patronage of Louis IX. of France, collected

the whole sum of knowledge of the Middle Ages, to which an anonymous author appended a valuable addition several years later. In 1677 Johann Jacob Hoffman published his "Universal Lexicon" at Basel, Germany, and in 1697 Pierre Bayle, the French critic, published his well known "Dictionary of History." The most extensive of the newer German works is Meyer's "Lexicon."

The first English encyclopædia containing subjects in alphabetical order was the "Lexicon Technicum" published in 1704. Among the newer English works are "Encyclopædia Britannica," published at Edinburgh in 1788; Charles Knight's "Penny Encyclopædia," and "Chambers' Encyclopædia." The English publications have been revised from time to time and circulated largely in America, for which purpose American supplements or additions were combined with the English publications. The most extensive encyclopædia ever published in the world is the Chinese "Encyclopædia of Literature and Science," containing 5,040 volumes. It embraces information on practically every subject known to the people of the Celestial Empire. Among the leading American publications are the "International;" "Johnson's," and the "New American." There are also numerous works treating on special subjects, such as biography, anatomy, ethnology, zoology, etc.

ENDICOTT (ĕn'dĭ'kŏt), **John**, colonial governor of Massachusetts, born at Dorchester, England, in 1589; died in Boston, Mass., March 15, 1665. He came to America in 1628, took charge of the plantation at Naumkeag, now Salem, and exercised the chief authority until John Winthrop was appointed governor, in 1630. He was deputy-governor of the Massachusetts Bay Colony in 1641-44, and served as governor from 1644 till 1665, except only several intervening years. Among the early Puritans he ranked as fearless and energetic, established the first mint in the colony, removed the cross of St. George from the military standard, opposed long hair, insisted upon women wearing veils at public assemblies, and was instrumental in executing four Quakers. It is related that he was universally respected as a kind and brave man, though his temper was regarded of considerable tension.

ENDICOTT, William C., statesman, born in Salem, Mass., Nov. 19, 1826; died May 6, 1900. He descended from the family of Governor John Endicott, graduated at Harvard University in 1847, studied law for three years, and in 1850 was admitted to the bar of Massachusetts. After pursuing a highly successful practice, he secured an appointment, in 1873, to the Massachusetts supreme court, but resigned in 1882 on account of impaired health. President Cleveland selected him as secretary of war for his first administration, and as such he distinguished himself by efficient services. Joseph Chamberlain, of England, married his daughter.

ENDOGENS (ĕn'dō-jĕns), one of the two primary classes of plants into which the vegetable kingdom is divided, the other being exogens. This designation of character is determined from the structure of the stem, which has the wood in threads mixed with the pith and scattered throughout every part, never forming layers, and from the wood of which the bark can not be peeled, because of its being partly developed in the interior of the stem. The embryo has but one cotyledon; the leaves are nearly always parallel-veined, and the flowers have their parts in threes or a multiple of three, very rarely in twos or fours, but never in fives. In germination the original radicle issues from a sheath, and, in growing upward, each successive shoot of the stem issues from a former sheath. Palms, bananas, lilies, grasses, and sedges belong to this division.

ENDYMION (ĕn-dĭm'ĭ-ŭn), a mythical youth of Greece whom Zeus had endowed with eternal youth, combining with it the faculty of sleeping as long as he wished and whenever he desired. When Selēnē saw him asleep on Mount Latmos, his cold heart warmed by the beauty of the youth, and that being came from heaven every night to watch over and protect him. "Endymion," the beautiful poem of Keats, is based on this interesting legend.

ENERGY (ĕn'ẽr-jў), the capacity to do work. Work is always done at the expense of energy. All natural phenomena are caused by energy acting on matter. Whenever it is expended to produce a phenomenon, such energy must be drawn or transferred from some stock of existing energy. For example, when the spring of a watch is run down, and has thus expended the energy it possessed, it requires a new store of energy to be imparted to it. If a book falls from the table to the floor, it requires that energy be imparted to it in order to raise it from the floor to the table. When the book reaches the table, it has acquired energy sufficient to enable it to do work exactly equal to the amount expended on it in raising it that distance. This energy of motion is called kinetic energy. So long as the book rests on the table the distance times the weight of the book is stored in the book, and the energy so stored is called potential energy.

Experiments in great number have proved that there is never any destruction of energy. It may be transferred from one body to another, or differently distributed among bodies at different times, but the sum total in all the bodies is not lost. Matter and energy never change. In order to effect transmission when there is no solid or fluid matter to act as a conductor it must either leap through empty space, or be carried by something in space which we cannot see or otherwise detect. Hence, physicists assume the existence of a medium called

ether. The energy which resides in ether waves is called radiant energy. The form of energy is known by diversified terms, dependent upon the nature of its work. It is known as light, when it affects the eye; heat, when it raises the temperature; actinic, when producing chemical changes, and electric, when producing conditions of electrification.

ENFIELD (ĕn'fēld), a city of Middlesex county, England, nine miles northeast of London. It is celebrated on account of the manufacture of rifles and small arms for the government. Population, 32,385.

ENFIELD, a town of Hartford county, Connecticut, on the Connecticut River, about ten miles south of Springfield, Mass. It is noted for its extensive manufactures and jobbing trade. Among the enterprises is the famous Thompsonville carpet factory, in which about 350 looms are employed, having a capacity of 6,000,000 yards annually. It is also the seat of the Hazzardville powder mills, one of the largest institutions of the kind in the world. Other factories produce vehicles, plows, sewing machines, timber products, and implements. Population, 1900, 6,699.

ENGEL (ĕng'el), **Ernst,** statistician, born in Dresden, Germany, March 26, 1821. He took a course of instruction at the school of mines in Freiburg, traveled extensively in European countries, and received an appointment, in 1848, as secretary of the commission for investigating industrial questions. The following year he was made its president; was connected with the bureau of statistics in 1850-58, and became its director in 1860. Among his valuable literary works are "Country and Inhabitants of Prussia;" "Age of Steam," and "Industrial Statistics of Germany, Europe, and North America."

ENGELMANN, George, botanist, born in Frankfort-on-Main, Germany, Feb. 2, 1809; died in St. Louis, Missouri, Feb. 4, 1884. He studied medicine and the natural sciences at Heidelberg and Berlin. Subsequently he was connected for some time with the University of Berlin, but came to the United States, settling in St. Louis as a physician. In 1836 he founded a German newspaper, contributed to the "Proceedings of the American Academy," and secured an appointment under the government to prepare botanical reports in relation to North American plants. The most valuable portion of his work relates to the investigation of pines, cacti, and spurges. It is given in reports, including about one hundred, which have been published as the "Botanical Works of George Engelmann." His library and herbarium were bequeathed to the Missouri Botanical Gardens.

ENGINE, a machine of complicated parts for utilizing some force in nature to perform work. See **Steam Engine.**

ENGINEERING (ĕn-jĭ-nēr'ĭng), the art of making, building, or using engines and machines, or of designing and constructing public works, requiring special knowledge of materials, machinery, and the laws of mechanics. The range of knowledge required for the different departments is quite diversified, and each of these does not admit of strict definition as now divided. The six principal divisions of this branch of learning consist of military, marine, mechanical, civil, electrical, and mining. Military engineering includes the planning, constructing, and maintenance of fortifications and gunnery, artillery, and telegraphy as applied in warfare. Marine and naval engineers are concerned with works partly of a military and partly of a naval character, such as the planning and construction of vessels of war, engines, and torpedoes. Mechanical engineering requires efficiency in the invention, contrivance, and adjustment of machinery. It is necessary that the mechanical engineer be acquainted with the quality and strength of the materials used, of the power of steam, and the parts of engines, with mill-work, including those propelled by steam, water, and wind.

The work of a civil engineer covers the most diversified field of study, and was not developed in England until about the middle of the 18th century; the engineers employed in that country prior to that time were generally secured from Holland. Civil engineers have to do with the construction of railroads, canals, aqueducts, harbors, highways, bridges, and drainage works. Electrical engineering as an art sprang into recognition in recent years, owing to the multiplied uses of electricity in the propelling of machinery and the employment of electricity in the arts. The work of an electrical engineer has to do with the construction, fitting, and care of electrical machinery, the building of electrical car lines, telephones, and telegraph and oceanic cables. Mining engineering is concerned with the working and raising of materials in copper, iron, coal, and other mines. Several important associations of engineers have been organized and are maintained in the United States. The most important among them are the American Institute of Mining Engineers; American Society of Mechanical Engineers; American Institute of Electrical Engineers; American Society of Civil Engineers, and Western Society of Engineers. All of these have meetings at specified times to discuss important questions in relation to their interests, prepare published reports, and support libraries and periodicals for the general dissemination of knowledge and skill.

ENGLAND (ĭn'glạnd), the name applied to the greater portion of the island which constitutes England, Scotland, and Wales. Its coast line is greatly lengthened by numerous windings and identations, the most prominent being Bristol Channel, West Bay, The Wash, Mouth of the Thames, and Morecambe Bay. The length from north to

south is 365 miles, greatest breadth about 250 miles, and area 50,975 square miles. Among the principal islands belonging to England are the Isle of Man, Channel Islands, Holy Island, Farne Island, Isle of Wight, Scilly Isles, and Lunday Islands. The highest elevations include the Cornish Heights, Cumbrian Mountains, and Cheviot Hills; the latter trend from Solway Firth parallel to the boundary line of Scotland. The North Sea washes the eastern shore; the Strait of Dover and the English Channel the southern, while the Atlantic Ocean and the Irish Sea form a part of the western boundary. Wales, on the western border, forms an irregular boundary from Bristol Channel to the Irish Sea, while Scotland forms all the northern. The surface is more productive and better adapted to agriculture than any other part of the British Isles. Fertile plains stretch over the eastern portion, while numerous valleys penetrate the hills of the western part. The elevations do not greatly exceed 3,000 feet, the highest summit of England being Scawfell, which rises 3,210 feet above the sea-level. Numerous small streams drain the surface, the larger number of which flow into the North Sea. Among the more important rivers are the Thames, Nen, Trent, Derwent, Avon, and Severn. The productions are extensive and diversified, and are treated in the article on Great Britain.

England was invaded by the military forces of Cæsar in 55 B. C., and later became a Roman possession. Its history proper begins from the withdrawal of the Roman forces in the early part of the 5th century A. D., when the Germanic people invaded portions of what was known as Albion or Britain. These Germanic people first moved west from Germany into the lands now called Denmark and Schleswig, and later came to England, being attracted by opportunities of development and numerous settlements of the Gauls, Germans, Iberians, Dacians, Italians, Phrygians, and others that located there during the time of the Roman occupation. Those conquering the country were made up largely of Jutes, Angles, and Saxons, the term Anglo-Saxon originating from the latter two, and the country itself deriving its name from the Angles or Inglisc. The German ideas and forms of local government began to be introduced about the middle of the 5th century, and from them the language and civil institutions largely originated. From this mixture of races, which was influenced, no doubt, by non-Aryan races that preceded them, among them the Euskarians and Celts, sprang the English, a self-reliant, industrious, ambitious, and daring people, who built up a language and institutions that influenced all modern civilized nations, and even gave form to many of the savage. Their commerce, culture, and industrial enterprises have vied with the powerful nations of modern times, and from them sprang great enterprises more or less transplanted to the extensive colonies of Great Britain. At present England is divided into forty counties, each having a local organization, similar to the divisions of states recognized in the United States, and England as a whole is under the government of Great Britain, a constitutional monarchy. London, situated on the Thames, is the capital of the United Kingdom and of Great Britain, and is the largest city in the world. Other important cities include Leeds, Liverpool, Manchester, Nottingham, Westham, Kensington, Derby, Cardiff, Bristol, Bradford, and Leicester.

The early history and events that led to the final building of an independent kingdom were complicated by many civil and religious struggles, which extended themselves over a period including many centuries. The Jutes formed settlements in the Isle of Wight, Kent, and adjacent regions, while the Saxons occupied tracts in the south, and the Angles in the north. The struggle for supremacy that resulted from conflicting claims covered a period of 150 years, and terminated in the Teutonic tribes occupying the entire southern portion of Britain, except only Wales, West Wales, and Strathclyde. The territorial divisions were small, though seven of the most important formed an alliance of friendship known in history as the Heptarchy. This protracted struggle finally terminated by annexing the smaller divisions to the more powerful neighbors, and Egbert succeeded in securing sovereignty over the seven kingdoms in 827, to which the name England was first applied. Prior to the Teutonic conquest Britain was largely isolated from continental Europe, but soon after the learning and culture of older civilization was introduced, a closer intimacy established, and a written literature began to form. Though the conquerors were strangers to Christianity, they were converted district by district after a severe contest, which reached its height in the 7th century. Soon after the Danes began to make incursions. About fifty years after the formation of the united kingdom they became masters of the whole of England, though their reign was only momentary.

Alfred the Great ascended the throne in 871, and succeeded in defeating the Danes at Ethandune in 878. The nine succeeding monarchs were more or less in conflict with Danish incursions, the latter of whom, Edmund II., was compelled to surrender a portion of his kingdom to Canute, and, when the former was assassinated in 1017, the sovereignty of the entire country fell into the hands of the Danes. The name Great was attached to Canute on account of his personal qualities and the extent of his possessions, which included, besides England, Denmark and Norway. He was followed by two Danish kings who managed the govern-

ment with moderation, though their reign was disturbed by Norman incursions and Saxon revolts. Two Saxon kings followed the Danish, but in 1066 the country fell to William of Normandy and the country was governed by Norman kings sixty-nine years. After the death of Henry I., Stephen, son of the count of Blois, raised an army in Normandy with which he proceeded to England and claimed the kingdom. Civil war was carried on for a series of years, but finally terminated in a peace, in which Stephen was recognized as sovereign for life, but Henry, son of Matilda, daughter of Henry I., was to succeed him on the throne. As Stephen died in 1154, Henry II. became his successor, and the Plantagenet line of succession ruled England for 245 years.

During the reign of the Plantagenet line the country was more or less disturbed by conflicting claims of the people against the feudal system of land ownership established after the Norman conquest. Wars with Wales and Scotland also followed, and local disturbances were caused by the pretensions of the Lancasters and Yorkites. The claims of the people to their ancient rights and liberties were recognized in the Magna Charta, called the Great Charter, on June 15, 1215, and, under the leadership of Simon de Montfort, Henry III. was seized and required to pledge the organization of parliament, which gave the people the right of representation and led to the permanent establishment of the house of commons. Richard II. was compelled to surrender to 60,000 malcontents, and was succeeded in 1399 by Henry IV., the first representative of the house of Lancaster, which governed England for sixty-two years, and was succeeded by the York dynasty after a long line of struggles for supremacy.

Henry Tudor gained the battle of Bosworth in 1485, in which Richard III. was slain, and the throne was ascended by Henry VII. During the reign of his successor, Henry VIII., England was disturbed by the Reformation. Events formed quickly by which Elizabeth ascended the throne and became the nominal head of the Protestant faith. Her reign was also characterized by remarkable rivalry in architecture, and commercial competition for colonization in opposition to Spain. She was succeeded by the Stuarts, whose sovereignty was weakened by constant disputes with the parliament and the rise of the republican forces, stimulated largely by Oliver Cromwell. The people finally wrung from the king the right of petition, by which the power to levy taxes became vested in the house of commons, and the king was abridged in his authority to govern in many matters of vast interest. Cromwell succeeded in establishing the Commonwealth in 1649, with himself as lord protector, though it survived him but a short time, terminating abruptly under the feeble protectorate of his son, Richard, and Charles II. was called to the throne by the restoration of 1660.

The old dissentions between the king and parliament soon broke out anew and William of Orange, supported by the whig party, drove James II., successor of Charles II., from the country and became the first parliamentary king. When Queen Anne ascended the throne, she found the grand alliance with Holland and Germany of much value. Her government was further strengthened by the success of her army at Blenheim in 1704, and at Ramilies in 1706, under Marlborough. The history of England became merged into that of Great Britain in 1807, by virtue of the act of union passed in that year uniting England and Scotland. In 1714 the Hanover dynasty succeeded to the throne, and the last attempt of the Stuarts was thwarted in 1715. Below is a complete list of English sovereigns:

Dynasty and Title.	Began.	Years.
Anglo-Saxon Line.		
Alfred, king of Wessex	871	30
Edward I., king of Wessex	901	24
Athelstan, king of England	925	15
Edmund I.	940	6
Edred	946	9
Edwy	955	4
Edgar	959	16
Edward II.	975	3
Ethelred	978	38
Edmund II	1016	1
Danish Line.		
Canute	1017	19
Harold I.	1036	3
Hardicanute	1039	2
Saxon Line.		
Edward III.	1041	25
Harold II.	1066	....
Norman Line.		
William I.	1066	21
William II.	1087	13
Henry I.	1100	35
House of Blois.		
Stephen	1135	19
Plantagenet Line.		
Henry II.	1154	35
Richard I.	1189	10
John	1199	17
Henry III.	1216	56
Edward I.	1272	35
Edward II.	1307	20
Edward III.	1327	50
Richard II.	1377	22
House of Lancaster.		
Henry IV.	1399	14
Henry V.	1413	9
Henry VI.	1422	39
House of York.		
Edward IV.	1461	22
Edward V.	1483	....
Richard III.	1483	2
House of Tudor.		
Henry VII.	1485	24
Henry VIII.	1509	38
Edward VI.	1547	6
Mary.	1553	5
Elizabeth	1558	45
Stuart Line.		
James I.	1603	22
Charles I.	1625	24

Dynasty and Title.	Began.	Years.
Commonwealth.		
Oliver Cromwell	1649	10
Richard Cromwell	1658	....
Stuart Line.		
Charles II	1660	25
James II	1685	3
House of Orange.		
William and Mary	1688	14
Stuart Line.		
Anne	1702	12
Hanover Line.		
George I	1714	13
George II	1727	33
George III	1760	60
George IV	1820	10
William IV	1830	7
Victoria	1837	64
Edward VII	1901	....

The English language spoken in modern times is entirely Germanic in its general character and grammatical construction, though it resembles more nearly the Low German than the higher class in general use. There are three periods in its history, including Old English, Middle English, and Modern English. The first of these extends from the German conquest of England in about 450 to the Norman conquest in 1066; the second to about 1400, and the last embraces all the period from the latter date. Old English or Anglo-Saxon included several dialects, all of which were highly inflected. Two languages were spoken from the Norman conquest till about the middle of the 13th century, but these became greatly mixed, and, after a time, the French merged with the Anglo-Saxon, forming the Middle English, the language of Chaucer, Langland, and Wyckliffe. Modern English differs so materially from the older forms that few words of the latter resemble the English of the present time. Discoveries, inventions, diversifications of industries, and advancement in science and subtlety of thought have all modified and enlarged the language, and, for that matter, all others. It is estimated that the English language is spoken by about 115,000,000 people, though it is understood by fully 120,000,000. The population of England and Wales, according to the census of 1901, is 32,525,716.

ENGLISH LITERATURE, the written or printed productions of English writers, dating from the earliest period in the history of England and continuing to the present time. It divides itself into three periods—from its beginning to the Norman conquest in 1066; from the Norman conquest to the Reformation under Henry VIII. in 1527-47, and from the Reformation to the present time. The literature of the period antecedent to the conquest may be divided into Celtic, Latin, and Anglo-Saxon, and is of a form that cannot be read except by students making its study a specialty. The most eminent Celtic writers include Llywarch Hen and Merlin or Merddhin, and the Latin writers embrace Ethelwerd and Bede. The Norman period extends from the conquest in 1066 to the commencement of English literature in 1255. Prior to the conquest a form of Anglo-Saxon literature had developed, and was represented in the "Anglo-Saxon Chronicle," which continued to be published until 1154, when the native language went practically out of use. At that time Latin was generally used in history, law, and philosophy; while French was employed in poetry and the literature for general reading. After the loss of Normandy, in 1204, the English-speaking people gradually attained to a majority, and we find English employed by Roger Bacon, Geoffrey of Monmouth, and Geoffrey Chaucer. The latter is regarded the first great poet of England, and, though a student of French romance and chivalry, he wrote verse in the English. He translated "Romance of the Rose" into English, and in later years made a study of Italian literature, thus giving the English the benefits of translations from Dante, Boccaccio, and Petrarch. Among the most famous writings of Chaucer are "Assembly of Fowls;" "House of Fame," and "Canterbury Tales." Though city-bred, Chaucer was a lover of the fields and flowers and showed a marked sensitiveness to the charm and beauty of the world. His "Canterbury Tales" is the most noted of his works. It is written in a poetic form, and relates the plan of a company of thirty who journeyed from London to Canterbury, where they designed to visit the shrine of St. Thomas à Becket. The poem relates the different stories told by each member of the company. Among the contemporary writers of Chaucer were the poets, John Gower (1325-1408), Robert Langland (1332-1406), and the prose writer, John Wycliffe (1324-84). The writings of this period took on the form of the English as written at the present time.

The writers of England between the time of Chaucer and the end of the 16th century were largely imitators of that poet, including James I. of Scotland, John Skelton (1460-1529), and Sir Thomas More (1478-1535). It may be said that this period was generally barren, but with the invention of printing an appetite for literature began to awaken. This was due largely to the fact that the Crusades came in contact with Greek scholarship in Constantinople and southern Europe, where a taste for Greek and Roman literature was still alive. When the Turks drove the Greek scholars from Constantinople in 1453, they spread rapidly toward the west and found many young persons eager to learn the classics and philosophy of Greek and Roman masters. There was not only a tendency to journey to Italy for the purpose of studying, but scholars were induced to come to western Europe and gradually found their way to England. It was the height of ambition to be able to read

Homer and Plato, and to discourse on the writings of Demosthenes and Cicero. The discovery of America also led to a greater interest in geography, opened new avenues of commerce and social activity, and rapidly prepared for a transition from the Middle Ages to the dawn of learning. While Erasmus, the Dutch scholar and philosopher, was teaching Greek at Oxford, he aroused an interest in the New Testament, and published "Christian Soldiers' Dagger." William Tyndale translated the New Testament into English, which he published in Germany in 1525, and circulated it extensively in England. In the meantime the Reformation in England came on in the reign of Henry VIII., who separated England from Rome, thus paving the way for the enthusiasm always attending a great epoch prominently affecting a large number of people. Sir Thomas More, the author of "Utopia," was beheaded, and many other writers suffered a similar fate.

Among the prominent literary men immediately after the Reformation are Sir Thomas Wyatt, the first artistic poet, and Henry Howard Surrey, a writer of sonnets and blank verse. These and other writers gave an impetus to literature by making songs and sonnets national, and prepared the way for the Elizabethan age of literature. This age is famous because of the large number of men who came forward with writings of merit, such as Edmund Spenser, William Shakespeare, Ben Jonson, Roger Ascham, Francis Bacon, and Lyle the Euphuist. Other writers of this period include Peele, Marlowe, Greene, Herbert of Cherbury, Middleston, Marston, Raleigh, and North. The writings of Shakespeare, which appeared between 1585 and 1616 are the most prominent of the period and in many respects are the finest in English literature. They possess a wealth of imagination rarely equaled, and embody passages of the gravest wisdom, the purest motives, and the tenderest feeling. Ben Jonson took high rank as a song writer, and also produced a number of excellent comedies and other plays. Philip Massinger (1583-1640) ranks among the dramatists of this period; Abraham Cowley (1618-1667), among the lyric poets; Thomas Hobbes (1588-1679), among the historians, and John Milton, among the prose writers. Milton's "Paradise Lost" is a masterpiece of English literature, and other productiions of great value include "Paradise Regained," "Il Penseroso," "Hymn on the Nativity," and "L'Allegro." Other religious writers of the same period include James Usher (1581-1656), Jeremy Taylor (1613-67), John Biddle (1615-1662), and Richard Baxter (1615-91). John Bunyan, author of "Pilgrim's Progress," marks an epoch in English literature. Few works have been so widely translated and so extensively read as his masterpiece, the "Pilgrim's Progress."

John Dryden wrote many popular plays after the restoration, and is the author of "Hind and Panther," a religious discussion, and "Absalom and Achitophel," a famous satire. The death of Dryden in 1700 marks the beginning of the Augustian age in English literature, and its greatest poet was Alexander Pope. This age witnessed the advent of many scientific and philosophical writers, among them Sir Isaac Newton, John Ray, John Locke, Richard Steele, Joseph Addison, Jonathan Swift, James Thompson, and Thomas Gray. James Thompson is best remembered by his "Seasons," Thomas Gray by his "Elegy Written in a Country Churchyard," and Daniel De Foe by his "Robinson Crusoe." Samuel Richardson published "Pamela," one of the first modern novels, and Henry Fielding is favorably known by his "Joseph Andrews," "Tom Jones," and other novels. Samuel Johnson stands as the literary representative of the second half of the 18th century. His most famous works include "Lives of the Poets" and "Vanity of Human Wishes." The name of Oliver Goldsmith is inseparably connected with that of Johnson, and he is the writer of "Vicar of Wakefield," "Deserted Village," and the comedy, "She Stoops to Conquer." William Cowper is an eminent poet of the latter part of the 17th century, and is noted for his introduction of profound religious sentiment. Richard B. Sheridan is the author of "School for Scandal" and a number of other popular writings. David Hume, Adam Smith, Edmund Burke, and Edward Gibbon are among the most eminent historians and political writers of the latter part of the 18th century.

The 19th century is the greatest in the history of English literature, both in the character of the productions and in the number of writers. The early writers of this period include Samuel T. Coleridge, whose "Ancient Mariner" represents the finest type of ballads; William Wordsworth, author of "Recollections of Early Childhood," and Sir Walter Scott, writer of "Ivanhoe," "Rob Roy," "Kenilworth," "Lay of the Last Minstrel," and "Lady of the Lake." Other poets of the 19th century include Lord Byron, Percy Shelley, John Keats, George Crabbe, Leigh Hunt, Thomas Moore, Alexander Smith, Elizabeth Browning, Robert Browning, Lord Lytton, Robert Buchanan, Alfred Tennyson, William Morris, Matthew Arnold, and Charles Mackay. The novelists embrace Jane Austen, Lord Lytton, Benjamin Disraeli, Charles Dickens, Charlotte Bronte, Charles Reade, Charles Kingsley, George Eliot, William Thackeray, George Meredith, R. D. Blackmore, George MacDonald, and Thomas Hardy. Among the philosophical writers are John Stuart Mill, Alexander Bane, Sir W. Hamilton, Charles Darwin, Herbert Spencer, Max Müller, Thomas H. Huxley, John Tyndall, and T. H. Greene. The historical and

biographical writers include Thomas B. Macauley, Thomas Carlyle, John R. Green, Lesley Stephen, John Morley, Cornwall Lewis, James A. Froude, Alexander W. Kinglake, William E. Lecky, and Dean Stanley. Among the prominent theological writers are Isaac Taylor, Julius Hare, Stopford Brooke, Henry P. Liddon, Augustus Hare, John H. Newman, Richard Whately, and John Maurice. Other writers of note include John Ruskin, Harriet Martineau, W. E. Gladstone, Sir Arthur Helps, Matthew Arnold, Thomas De Quincey, George Grote, Michael Faraday, Edward A. Freeman, and Thomas Henry Hall Caine (b. 1853).

ENGLEWOOD (eng'l-wo͝od), a town of New Jersey, in Bergen county, fourteen miles north of New York City. It is situated near the palisades of the Hudson River, has good railroad facilities, and is the seat of several fine school and church buildings. Many New York business men reside in Englewood. There is connection with the city both by railway and street cars. Population, 1900, 6,253.

ENGLISH CHANNEL, an important body of water connecting the Atlantic Ocean with the North Sea, and separating France from England. On its eastern end it is connected with the Strait of Dover, where it is twenty-one miles wide, and at the western end it has a width of about one hundred miles. A strong current running eastward passes through the channel, influenced largely by the Gulf Stream, and its waters are often disturbed by storms.

ENGRAVING (ĕn-grāv'ing), the art of cutting marks or figures on wood, stone, or metal. Engraving is very ancient, being mentioned in Exodus xxviii, 36. The oldest records were cut in stone; some by making depressions, and others by cutting the stone away and leaving the characters in relief. In Egypt the hieroglyphics were cut in the granite monoliths and on the walls of tombs and chambers. Later the Greeks learned the art from Egyptians and Phœnicians. The discovery of the practicability of taking impressions upon paper from an engraving was made by a Florentine artist named Maso Finiguerra, about 1440. In taking a cast in sulphur of some engraved church ornaments, a quantity of dust and charcoal, which had gathered in the lines of the engraving, came out upon the sulphur and gave an unexpected and suggestive effect. There are several varieties of engraving, chief among them are line engravings on metal plates, usually copper or steel; etchings on metal, in which the lines are corroded by means of acid; mezzotints, in which there are no lines, but only shades produced by roughening the surface of the metal; and woodcuts. Wood engravings intended for printing long preceded those made of metal.

The process of printing from engravings was common in China in the 10th century, but it remained a secret with them for many years. The Italians and Germans attained considerable skill in engraving as early as the 13th century, but the earliest known niello proof on paper was made in 1452. Within the three succeeding centuries the art became extremely productive under such artists as Albert Durer (1471-1528), Peter P. Rubens (1577-1640), and developed until imitations of all varieties of engravings were made in woodcuts, but the practiced eye sees at a glance that the result is nothing but a woodcut. Through lack of encouragement, change of fashion, and the adoption of other cheaper methods of production the woodcut and line engravings are going rapidly out of use. Besides, there are not sufficient inducements for young men to pursue study in this particular process of engraving, for the reason that the newer and more rapid methods are supplanting it.

Copper is used extensively in making plates for certain kinds of engravings, especially those in which a soft metal is serviceable. The invention of steel engraving in the United States has brought that metal into use for the finer pictures, owing to its greater hardness, which enables it to overcome the wear of printing and makes it possible to take a larger number of impressions than can be gotten from a copper-plate. Etchings are made by covering a prepared metallic surface with a thin coat or ground, which is not affected by acid. The design is traced with a pointed tool, which lays the metal bare wherever it touches. A wall of wax is raised around the design to hold the diluted acid, when poured on. For a copper-plate this consists of five parts water and one part nitrous acid; for steel, pyroligneous acid one part, nictric acid one part, water, six parts. The acid corrodes on the lines made through the ground. This is called biting-in. When a sufficient depth is attained for lighter tints of the etching, the acid is removed and the surface washed and allowed to dry. The parts of sufficient depth are now varnished; when dry, another biting-in deepens the lines not varnished, and, when deep enough for the second tint, it is removed again. This may be repeated several times, if necessary. Etchings are sometimes finished by a graver and partake of the character of a line engraving. Glass may be engraved in a similar manner. Soft-ground engraving is another of the many ways of drawing the design. In mezzotint engraving the entire surface of the plate is roughened slightly, after which the drawing is traced, and then the portions intended to show high lights or middle lights are scraped or burnished, and the shadows are strengthened. Engravings so produced resemble photographs.

It is to be noted that the photo-mechanical processes of engraving have been improved materially since 1880. The half-tone process invented by Frederic E. Ives, an American, in 1881; the line relief process; the intaglio-

engraving process, and the wax process are the most common. The half-tone is used largely in the better class of magazines; the line-relief process for cheap newspaper illustrations; the chalk-plate for small newspaper cuts and by the United States in making weather maps, and the wax process for making railroad, geographical, state, county, and town maps.

ENID, county seat of Garfield county, Oklahoma, about thirty-five miles north of Kingfisher. It has good railroad facilities, is surrounded by a fertile farming region, and has a considerable trade in merchandise and farm produce. There are a number of fine school and church buildings. Population, 1900, 3,444.

ENSILAGE (ĕn'sĭ-lāj), in agriculture, a process of preserving green forage crops for stock feed. Dairy farmers have a method of storing green fodder in mass and covering it over in deep trenches cut in a dry soil, by which the natural condition is readily preserved, though the ordinary way of handling ensilage is by cutting the crop, usually corn, and placing it in an air-tight mow or silo for curing. The crop product is stored as near as practicable to the place of feeding in order to insure the greatest possible convenience. In corn culture for ensilage farmers aim to produce the largest possible quantity of both corn and forage. The crop is cut a brief period before being ripe enough for ordinary cutting. It is then taken to the mow and, after being cut in proper lengths, is carefully stored by placing successive layers and tramping them as firmly as possible. The ensilage may be stored to a height of twenty or thirty feet, and, after settling several days, the upper portion may be refilled, and later covered with grass or straw, and straw may also be distributed through the entire amount stored for convenience in feeding. This class of forage crops is a very nutritious and wholesome food for cattle, sheep, and horses. Successive experiments have proved that more food can be secured per acre by the culture of crops and their preservation as ensilage than in any other way.

ENTOMOLOGY (ĕn-tō-mŏl'ō-jў), the science which treats of insects. Aristotle called attention to one of the essential characteristics by pointing out that the bodies of insects are cut or divided into segments, from which their name was derived. See **Insects.**

ENTOZOA (ĕn-tō-zō'ȧ), the name given by Karl Asmund Rudolphi (1771-1832), a Swedish naturalist, to a class of animals living within the bodies of other animals. They are found in the intestines, liver, brain, muscles, and other tissues. According to a group of writers the entozoa are divided into three classes: cœlelmintha, or hollow worms; sterelmintha, or solid worms, as the tapeworms; and accidental parasites. Some writers treat them as equally mature and immature; the latter, inclosed in cysts, being far the most dangerous when found in inclosed cavities, as the lung or liver. See **Parasites.**

ENVELOPES (ĕn'vĕl-ōps), in botany, the whorls of alternated leaves designed to protect the organs of fructification from injury. In very rare cases there are none, sometimes one, though generally two—the calyx and the corolla. The name also applies to paper coverings for letters or notes that came into extensive use with the growth of the postal system. They are now shaped, folded, and gummed by machinery.

EOCENE (ē'ō-sēn), in geology, the first great division of the tertiary period. It was the dawn of the present order of shells and mollusks, a few birds, reptiles, and all the invertebrate animals still existing. Among the plants both endogens and dicotyledons were numerous. Man had not appeared upon the earth. The eocene strata consist of marl, limestones, clays, and sandstones. In most cases the strata were deposited in salt or brackish waters.

EOZOIC (ē-ō-zō'ĭk), the name given to rocks of the Laurentian age, in which, so far as at present known, the earliest traces of life are found.

EPAMINONDAS (e-pam-ĭ-nŏn'das), celebrated Greek hero, born about 418 B. C.; slain in 362 B. C. He came from an ancient family, lived in retirement till forty years of age, but was finally inspired with enthusiasm by Lysis, a follower of Pythagoras. In 385 he saved the life of Pelopidas in battle, a man of much virtue. Later he enlisted in the ranks of the patriots, and raised Thebes to the summit of power and prosperity. When sent to Sparta in 371, he displayed much firmness in negotiating terms of peace, though the treaty was not ratified and war was resumed. He was placed at the head of the Thebans and four times successfully invaded the Peloponnesus, and, when success had followed his last effort, he was mortally wounded by a javelin. The ancients extolled the justice and moral purity of Epaminondas as much as his military talent, and it is said of him that he never deviated from the truth, observing strict veracity even when jesting.

EPHESUS (ĕf'ę-sŭs), an ancient city of Asia Minor, situated in Lydia, near the mouth of the Cayster River. It was classed with the twelve Ionian cities founded by the Greeks, and was regarded sacred from an early period, though its importance dates from a time quite more recent than the Trojan War. The first of its great temples was founded about 650 B. C., completed after 120 years, and destroyed in 356 by Herostratus. It passed successively under the possession of the Lydians, Persians, Greeks, and Romans. In the time of Augustus it attained its greatest importance as a trade center, and was for three years the residence of St. Paul, who afterwards wrote his "Epistle to the Ephesians" while in prison at Rome, to

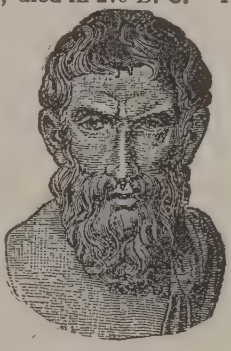
the church at Ephesus. Its second magnificent temple was destroyed by the Goths in 262 A. D., and they so plundered the city that it never again recovered its importance. The third ecumenical council of the Christian church was held at Ephesus in 431, at which resolutions condemning Nestorius were agreed upon.

The famous temple of Diana, counted among the seven wonders of the world, was located a mile east of the city, and at the birth of Alexander the Great the Ephesians burned it to add luster to his name. Many contributions were given and heavy taxes levied for the purpose of rebuilding it with even greater splendor, the new structure being the greatest of Grecian temples and containing 130 columns. This remarkable structure was 225 feet wide, 423 feet long, and contained statues and pictures of the most noted Grecian masters. Nero robbed it of its treasures; the Goths burned it, and its destruction was finally accomplished by an edict issued in 381 against pagan worship by Theodosius I. After numerous excavations were made by Europeans, the site of the temple was discovered in 1869, and many interesting remains were secured. In 1899 the Austrian Institute at Ephesus excavated several valuable relics, among them statues, a great market place, and a remarkable theater. Aiasoluk, a small village, is near the site of the city.

EPIC (ĕp'ĭk), a poem characterized by its narrative and descriptive style, especially one that celebrates in stately, formal verse the real or mythical achievements of heroes or great personages. Epic poetry is distinguished from lyric by giving prominence to the narration of action rather than the expression of emotion, and from drama in that the epic contains frequent allusions to the author as narrator. Among the great sacred epics of the world are Dante's "Divina Commedia" and Milton's "Paradise Lost;" among the heroic, Homer's "Iliad" and "Odyssey," Virgil's "Æneid," Tasso's "Jerusalem Delivered," and Aristo's "Orlando Furios." Among humorous epics are Pope's "Rape of the Lock;" "Battle of the Mice," and "Reynard the Fox." Byron's "Childe Harold" is written in a narrative style, but abounds in sentiment, and is both epic and lyric. This is true also of Burns' "Cotter's Saturday Night," Bryant's "Thanatopsis," and Longfellow's "Evangeline."

EPICTETUS (ep-ĭk-tē'tus), Greek Stoic philosopher, born in Hierapolis, in Phrygia, about 50 A. D.; died about 94 A. D. His early life was spent as a slave at Rome, where he became a nominal Stoic. After attaining his freedom, he studied philosophy, was driven into exile by Emperor Domitian and settled in Nicopolis, in Epirus, near the scene of the battle of Actium. His maxims were collected by his pupil Arrian, and published in a work called "Encheiridion," meaning hand-book, and a number of "Commentaries." The works still extant show an earnestness and nobility of character rarely surpassed. Among his teachings may be enumerated the theory that education lies in learning to wish things to be as they really are, and in acquiring ability to distinguish our own from the possessions of others. In others words, the sole true cause of our acting lies in our opinions and judgments, under the direction of a will.

EPICURUS (ep-ĭ-kū'rus), celebrated Greek philosopher, born on the island of Samos in 342 B. C.; died in 270 B. C. He was the son of Neocles, who was a schoolmaster, and at the age of eighteen years went to Athens, where he studied for a brief period under several masters, and later pursued the study of philosophy. He was influenced largely by the teachings of Anaxagoras and Democritus, and when thirty-two years of age opened a school of philosophy at Mitylene. Five years later he returned to Athens, where he founded a school of philosophy on a tract of land purchased by him and converted into a garden, from which his pupils were called "philosophers of the garden." Among his principal teachings may be enumerated the theory that happiness consists in living temperately, being kind to others, and content with one's own condition, though he held pleasure to be the highest good. His school became a great center of learning, attracted vast numbers from Asia Minor and various portions of Greece, and was a prolific cause of stimulating thought and directing effort. His writings included a large number of volumes, according to some writers about 300, on "Natural Philosophy;" "Justice;" "Love;" "Avoidance;" "Atoms and the Vacuum;" "Virtues," and numerous others.



EPICURUS.

Few of the writings of Epicurus are extant, though such fragments as "A Treatise on Nature" and detached messages still exist, but his teachings are known from the speeches of Cicero, Diogenes, Laërtius, and Lucretius. His doctrine, that pleasure is the highest good, led to the practice in life called Epicurean. It was understood by the Greeks, Romans, and later by the French societies to imply freedom in action and living, and one holding to this school of thought is still called an epicure. Some writers think that his views in regard to pleasure have been largely overdrawn, or perverted to a more liberal application than he intended. It is certain that Epicurus was a man of deep research and that he added knowledge

of material value. According to his views the cares of business arise from dependence on others, personal fear, and weakness. He taught that death, though the most terrible of evils, should not concern us, "since, when we are, death is not; and when death is, we are not."

EPIDEMIC (ĕp-ĭ-dĕm'ĭk), a disease which attacks many persons at the same time, spreading suddenly, often extremely virulent and fatal at first, then gradually becoming spent and feeble, so that the earliest stages are usually the worst. The plague, cholera, influenza, and la grippe are epidemics, while scarlet fever, typhoid fever, smallpox, diphtheria, and chicken-pox are usually so regarded. However, some of these are classed more generally as contagious diseases. All that can be said with certainty about epidemics is that at the beginning there must be some distempered conditions around us, and our systems be predisposed to the reception of the specific poison.

EPIDERMIS (ĕp-ĭ-dĕr'mĭs), in anatomy, the cuticle or scarf-skin, constituting the external layer of the skin and protecting inner ones. In man it is thickest on the palms of the hands and soles of the feet. It possesses an organized structure, but has no nerves or blood vessels. The outermost layer of cells covering the surface of plants, when there are several layers of tissue, is also called epidermis.

EPIGRAM (ĕp'ĭ-grăm), a name given by the Greeks to a poetic inscription on a public monument. It was applied originally to a short verse or poem having only one subject, and was finished by a witty or ingenious turn, but is now applied to any short composition expressed neatly and happily, as "The child is father of the man."

EPILEPSY (ĕp-ĭ-lĕp'sy), or falling sickness, a disease which derives its name from the suddenness of the attack. Usually the patient becomes unconscious and falls to the ground convulsed, turgid, and livid; frothing at the mouth, a choking sound in the windpipe, biting of the tongue, and nearly suffocating. After the patient reaches an exhausted, comatose condition, life is no longer in danger. Epilepsy may be caused by fear, passion, or an injury to the brain. In severe cases there is little hope of a cure, but patients may be afflicted with it from childhood till old age. Children often outgrow it at the period of adolescence.

EPILEPTICS (ĕp-ĭ-lĕp'tĭks), the persons afflicted with epilepsy. Within recent years considerable progress has been made in colonizing persons suffering with this disease, the purpose of which is to treat and care for them in the most satisfactory and efficient manner. The first colony for epileptics was established by Pastor von Bodelschwingh near Bielefeld, Germany, in 1867, and is known as the Bethel Colony. In 1890 the settlement contained, with its officers, physicians, nurses, and employees, about 3,600 persons. Under frugal watch-care it has been possible to render much good to the unfortunates afflicted with the disease; the number of cured discharged at the end of each year aggregating twenty-one per cent. of the entire number treated, while about the same per cent. are discharged as incurable. The marvelous development and success of the German colony led to a widespread movement in Europe and America to establish like institutions. Similar colonies are now located at Zurich, Switzerland; in Holland, France, and England, while the movement in the United States has attracted the attention of many state legislatures. The colony for epileptics in the state of New York is located at Sonyea; that of Pennsylvania at Oakbourne; that of Massachusetts at Monson, and that of New Jersey at Skillman, though there are many others. Colonies of this class are usually located on farms comprising from 200 to 1,200 acres of land, on which the labor of those afflicted is utilized in facilitating the support. A late report shows that the number of epileptics in the United States is 135,000, of which 9,500 are in Illinois, 12,500 in New York, and a proportional number in the other states and territories.

EPIRUS (ĕ-pī'rŭs), a country of ancient Greece, situated between Illyria, the Ambracian Gulf, the Pindus Mountains, and the Ionian Sea, and nearly corresponding to modern Albania. Among the interesting towns were Donoa and Ambracia. The region was noted on account of its supply of heavy timber and the production of corn and domestic animals. Among the people were several colonies, the Grecians proper occupying largely the southern coastal district. Pyrrhus was the most celebrated king of Epirus, and long waged war upon the Romans, but it finally became a province of Rome in 168 B. C. To prevent further insurrections the Romans plundered the country, razed seventy towns, and sold 150,000 of the people into slavery. It shared in the fortunes of the Roman and the Byzantine empires for many centuries, and was conquered by the Turks in the 15th century. Since the 14th century a large per cent. of the inhabitants have been made up of Albanians. A small strip of land situated east of the Arta River was ceded by Turkey to Greece in 1881, along with most of Thessaly.

EPITAPH (ĕp'ĭ-tăf), an inscription upon a tomb or monument in honor or memory of the dead. The Egyptians first used epitaphs, and later the Greeks and Romans. Subsequently the practice became general throughout all Christian nations. The usual characteristic features in the United States are to give the name, date of birth and death, with some quotation from the Bible, though epitaphs exemplify every variety of sense and taste, from lofty pathos to the vilest scurrility. Curious as it may seem, books con-

taining collections of epitaphs are among the most amusing.

EPIZOA (ĕp-ĭ-zō'ȧ), the name given to parasitic animals which live upon the external surface of other animals, such as lice, itch-insect, etc. See **Parasites**.

EPIZOOTIC (ĕp-ĭ-zō-ŏt'ĭc), an epidemic disease among animals. It is usually mispronounced in America as "ep-i-zoo-tic." The very fatal contagious catarrhal fever which raged throughout this country in 1870 and at different times since was only a form of the disease. Thousands of horses and cattle died at that time. Some pathologists claim to trace a connection between this disease and la grippe.

EPOCH (ĕp'ŏk), or **Era**, a point in the course of history from which preceding and ensuing years are computed. The creation of the world and the birth of Christ are the most important epochs, and on the former are based many notable chronologies. The creation is placed by Catholics and Protestants at 4004 B. C.; the era of Constantinople at 5508 B. C.; the era of Antioch at 5502 B. C., and the era of Alexandria at 5492 B. C. In Jewish writings the creation is placed at 3760 B. C., on which the Jews base their era. The Christian era, a mode of computing time from the birth of Christ, went into extensive use among Europeans about the year 1000, though it was introduced in the 6th century. The event of Christ's birth took place four years earlier than the date written in our calendar. The Julian epoch begins with 4713 and is based on the co-incidents of the lunar, solar, and indictional periods. Mohammedans compute time from July 16, 622, this being the anniversary of the Hegira of Mohammed. Among the Chinese it is customary to compute time by cycles of sixty years, and to apply a different name to every cycle.

EPPING FOREST (ĕp'ĭng), a beautiful pleasure resort near London, England. It comprises 5,600 acres of magnificent woodland, rises 760 feet above sea-level, and is improved by many structures and conveniences. In early ages it formed a portion of the hunting-ground of the kings, and constituted a part of the forest that covered all of Essexshire. The crowded populations of London largely utilize it for pleasure-walking and driving.

EPSOM SALT (ĕp'sŭm salt), or **Magnesium Sulphate**, a cathartic salt, so named because it was first obtained from the famous mineral springs of Epsom, a market town of England. It is soluble in water and is used as a purgative. This salt is obtained by an artificial process from magnesian limestone, the latter being treated with sulphuric acid, or by dissolving it in boiling water and allowing the insoluble matter to settle. Afterward the water is evaporated from the solution, leaving the salt.

EPWORTH LEAGUE, a young people's religious society of the Methodist Episcopal Church, organized in the United States in 1889. In 1900 it had 28,885 chapters and a membership of 2,000,000. The object is to promote an earnest, practical, intelligent and loyal spiritual life in the young people of the church, and corresponds to societies maintained for similar purposes by the Catholic, Christian, Presbyterian, and other churches. The "Epworth Herald" is the official organ of the League.

EQUATOR (ē-kwā'tẽr), the great circle imagined drawn around the earth midway between the poles, and which divides it into the northern and southern hemispheres. The distance from it to the poles is 90°. It forms the basis for measuring the latitude of places both north and south. Twice in the year, on Sept. 21 and March 21, the rays of the sun shine vertically on the equator, when the days and nights are equal all over the earth, from which the name equinox has been derived. The magnetic equator of the earth corresponds quite nearly to the geographical equator, and marks the point midway between the magnetic poles. On the equator the magnetic needle is horizontal, and, as the poles are neared, the dip of the needle increases, while at the poles it points vertically downward. Lines connecting places which have the same angle of dip are isoclinal and correspond in a very remarkable manner to the isothermal lines, showing a dependence of the intensity of magnetism on the distribution of the sun's heat.

EQUINOX (ē'qwī-nŏks), the time at which the sun, in passing the equator, renders the days and nights of equal length over the entire earth. This occurs when it enters one of the equinoctial points, the two equinoctial points being where the ecliptic and celestial equators intersect each other. The vernal equinox occurs on March 21, when the sun is in the first part of Aries, and the autumnal on Sept. 21, when it is at the first of Libra. At all other times of the year the length of the day and night is unequal, the greatest difference occurring at the poles. After the vernal equinox, the sun passes from south to north, causing the days to lengthen in the northern hemisphere; while, after the autumnal equinox, it passes from north to south, causing the days to shorten in the northern, but lengthen in the southern hemisphere. The precession of the equinoxes is due to the equinoctial points moving westward at the rate of 50″ in a year. The equinoxes, in March and September, are accompanied by storms known as equinoctial gales.

ERARD (ā-rar'), **Sebastien**, manufacturer of musical instruments, born in Strasburg, Germany, April 5, 1752; died in Paris, France, Aug. 5, 1831. At the age of seventeen he went to Paris, accompanying his brother, Jean Baptiste, to engage in the manufacture of pianos, producing his first instrument in 1777. Soon after the commencement of the French revolution he located a fac-

tory in London, but returned to Paris in 1796, where he became noted as a manufacturer of musical instruments. Among the inventions made by him are the grand piano, a double-action harp, and numerous improvements in the harp and piano.

ERASMUS (ē-răz'mŭs), **Desiderius**, philosopher and scholar, born in Rotterdam, Holland, Oct. 28, 1467; died in Basel, Switzerland, July 12, 1536. His name properly is Gerhard, meaning loved, though in accordance with the fashion among scholars of his age it was changed into the Latin and Greek equivalents. He studied at Deventer, where he displayed remarkable talents as a student of languages and literature. Later he entered a monastery near Delft and remained there as monk for six years. In 1492 he went to Paris to study six years, perfecting himself in theology and the humane sciences. He supported himself largely by giving private lectures. Soon after he went to England and became a student of Greek at Oxford under Finacre and Metcolet. Later he returned to Paris, enriched his knowledge by traveling in Germany and Italy, and became the teacher of Alexander Stuart, son of James IV. of Scotland, and with him visited numerous cities, but settled at Basel in 1514. In 1516 he published the first edition of the New Testament in Greek, this probably being his greastest work. Erasmus took a middle ground when the Reformation came, spending many of his later days in disputation with friends and foes, being unable to satisfy either party. The discussion with Luther on free will is among the most important, though there are many others from which he secured fame and consideration quite as lasting as were accorded to the more prominent men of letters. Many of the monarchs of Europe and others of influence and wealth sent him letters and presents as marks of friendship, and his correspondents included the most eminent men of learning. Among his writings are "Adagia," a collection of proverbs from the Greek and Latin; "Christian Soldier's Dagger;" "Praise or Folly," a satire on kings and monks, and "Colloquia."

ERASMUS.

ERASTUS, Thomas, celebrated physician and theologian, born in Baden, Germany, Sept. 7, 1524; died Dec. 31, 1583. The real name of this celebrated man was Thomas Lieber, having translated it into the Greek according to the fashion of his time. He graduated at the University of Basel, traveled extensively, and later attained a doctor's degree at the University of Bologna. His writings and lectures are numerous, and he exercised a marked influence upon medical theories and ecclesiastical and secular thought.

ERCKMANN-CHATRAIN (ĕrk'mänshä-tre-ŏn'), a compound name of two French-Alsatian writers of fiction. They formed a literary partnership in 1848, and together produced literary works known in all parts of the world. The partnership ceased in 1889, owing to differences over the division of the profits, though afterward the former friendship was re-established. Emile Erckmann was born May 20, 1822, in Alsace, now belonging to Germany; and died March 14, 1899. Alexandre Chatrain was born in Lorraine, Dec. 2, 1826; died in Paris Sept. 4, 1890. Both were educated in colleges of recognized standing, showed early aptitude for literary polish, and together produced their first work in 1848, a drama entitled "Alsace in 1814." The entire productions of the two writers include many volumes, and cover all manner of interesting topics, especially romances.

EREBUS (ĕr'ę-bŭs), **Mount**, a volcano situated in the Antarctic regions of South Victoria Land. It was discovered in 1841 by Sir James Ross; height 12,390 feet.

ERFURT (ĕr'fo͝ort), a city of Germany, in the Prussian province of Saxony, 145 miles southwest of Berlin. It is conveniently connected by numerous railroad lines with the important commercial and educational centers of continental Europe. The city was founded in the early part of the 5th century, and called Erpesford from its founder, Erpes. In the Middle Ages it grew rapidly, became strongly fortified, and until 1873 was counted a fortress of second rank. Its two citadels formerly were monasteries, while the cathedral, a splendid Gothic structure, is one of the finest in Germany. The University of Erfurt was founded in 1378, suppressed in 1816, and now ranks as an academy of science. Its buildings have been well maintained and its library numbers fully 75,000 volumes. The monastery is now called Martinsstift (Martin's monastery), and has been converted into an orphanage. It was the residence of Luther from 1501 to 1508. The surrounding country is agricultural. The city has modern facilities and produces woolen, cotton, silk, and linen goods, machinery, tobacco, leather, chemicals, and scientific instruments. Owing to its convenient location, it has been a point of contention by foreign invaders, became a part of Prussia in 1803, and was the seat of the celebrated congress of Erfurt in 1808, which was attended by the emperor of Russia, Napoleon, and various German monarchs. Population, 83,250.

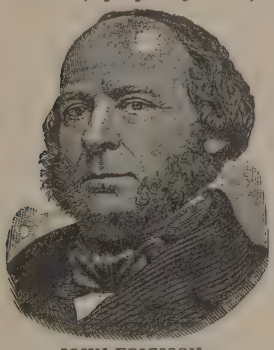
ERGOT (ēr'gŏt), a fungus found in rye, wild-rye, and other grasses, the principal symptom being that the seed, besides becoming black, grows elongated so as to resemble

a rooster's spur, whence the name ergot comes. When the disease begins, sphacelæ appear upon the pistils, and after a time a viscid fluid exudes from them. The disease is very fatal to the plants attacked, and, if eaten with sound grain, is dangerous to both man and animals. It causes contraction of the minute arteries by acting on their muscular walls, and is useful to check bleeding in parturition. In large quantities it produces nausea, delirium, stupor, and death. On the western plains it appears largely in wild rye, often causing much damage to large herds of domestic animals.

ERIC (ĕr-ĭk), the name of several Swedish kings, who ruled at different times between 1154 an 1568. The name is the Scandinavian form of Henry, and was applied to several monarchs who ruled Sweden and Denmark separately, though some governed the whole of Scandinavia after the union of Calmar.

ERIC, the Red, celebrated Norwegian navigator, who became associated with Icelandic explorations in 982. The following year he sailed westward from Bredifiord and discovered Greenland. After returning to Iceland in 985, he organized an expedition of discovery and with fourteen vessels reached the coast of Greenland. His son, Lief Eric, discovered the northeastern coast of North America in 1001, explored a portion of its coast, and named it Markland or Finland.

ERICSSON (ĕr'ĭk-sŏn), **John,** Swedish-American engineer, born in Langbanshyttan, Sweden, July 31, 1803; died in New York City, May 8, 1889. He became an engineer cadet at the age of twelve years, entered the Swedish army at seventeen, and was promoted captain in 1827. Subsequently he constructed a flame-engine, which gained a prize at London in 1828, and soon after produced in rapid succession an instrument for sea-sounding, a hydrostatic weighing machine, a tubular steam boiler, and numerous other useful machines. He emigrated to the United States in 1839. In 1853 he built the ship Ericsson, and invented a caloric engine by which to propel it. The screw propeller was patented by him in 1836, and was utilized the following year. It was later employed by the United States government in propelling the warship Princeton. In 1851 he exhibited several philosophical instruments at London, including a sea-lead, a pyrometer, and an alarm-barometer. The United States government employed him in 1861 to construct several ironclad vessels. Under this contract he completed the Monitor on March 9, 1862, which was successful in combatting with the ironclad ram Virginia. This little vessel contained a turret operated by machinery so that guns could be fired in any direction. Though the subject of jests by sailors, who named it a "cheese-box on a raft," it became famous and marked an epoch in the Civil War. In 1881 he built the vessel called the Destroyer for the United States government. Among his more recent scientific inventions is an instrument for making computation of the intensity of the solar heat and other influences affecting the rotary motion of the earth. In accordance with the request of the Swedish government and his own wishes the remains of Ericsson were taken to Sweden and buried at his birthplace. They were transferred with distinguished honors in the United States ship Baltimore to Stockholm. There they were received with like honors and carried to the last resting place under government escort. See **Monitor.**



JOHN ERICSSON.

ERIE (ē'rĭ), an important city in Pennsylvania, county seat of Erie county, on Lake Erie. Its harbor is one of the best on Lake Erie, being the only harbor in Pennsylvania, and is protected by a breakwater about four miles long. The city is midway between Cleveland and Buffalo, and occupies the location of Fort Erie, an old French fort. Besides its excellent advantages in lake commerce, it is connected by numerous railroads and takes high rank as an import and export city. The streets are well lighted and paved. They are lined with elegant mansions and beautified by fine trees and gardens. The adornments of the city include public parks, a fine soldiers' monument, city and government buildings, and excellent libraries. An abundant water supply is secured from the lake, the water being pumped into a tower 251 feet high, which is classed as the highest waterpipe in the world. The area of the city is about seventy square miles; the streets include 160 miles, while street car lines penetrate all portions and connect them with suburban districts. Among the noted institutions are the Soldier's Home, St. Vincent's Hospital, Home for the Friendless, Erie Academy, Clark's Business College, Erie Art School, and St. Benedictine Academy. The surrounding country is agricultural and fruit-producing. There are manufactures of fabrics, lumber products, tobacco, beverages, machinery, ironware, and hardware. About $4,500,000 is paid annually to laboring men engaged in the different industries. Population, 1900, 52,733.

ERIE, Lake, one of the five Great Lakes of North America, between Lakes Huron and Ontario. It washes part of the northern boundary of New York, Ohio, and Pennsylvania, the eastern shore of Michigan, and is bounded on the north by the province of Ontario. The discharges of Lakes Superior, Michigan, and Huron flow into it through the

Detroit River, while the outflow is into Lake Ontario by the Niagara River. Its width is from thirty to sixty-five miles, length 260, and area 9,600 square miles. The Sandusky, Maumee, and Detroit are the principal rivers flowing into it. Canal connections are maintained with the Hudson River by the Erie Canal; with the Ohio by the Ohio and Miami, and with Lake Ontario by the Welland. There are excellent fisheries and a large commerce. The naval victory gained by Commodore Perry over the British in the western part of the lake is commemorated by a monument at Cleveland, and by a stone on the island of Gibraltar, near which the battle was fought. Among the chief harbors are those of Erie, Buffalo, Sandusky, Cleveland, Toledo, and Dunkirk, besides several located in Ontario.

ERIE CANAL, the largest and most important canal of the United States, extending from Buffalo to Albany, New York, a distance of 351 miles. The canal was first suggested by Gouverneur Morris, and he was appointed at the head of a commission of seven members in 1810. The project was delayed by the War of 1812, but a law authorizing it was enacted in 1817, and the first canal boat passed through from Buffalo on Nov. 4, 1825, Governor Clinton being a passenger on the same. This canal greatly revolutionized trade with the lakes and the interior, since railroads were yet unknown. By means of it the time of travel between Buffalo and Albany was shortened from twenty to ten days, and the freight per ton reduced from $100 to $3. The canal as originally constructed was forty feet wide, four feet deep, and cost $7,602,000. In 1895 the sum of $9,000,000 was appropriated to deepen the canal to nine feet and otherwise improve it. However, the work cost more than twice that amount. Up to 1871 the propelling power consisted almost entirely of horses, though at that time steam-propelled boats were introduced, and at present electric motive power is used with success. The canal is twice carried over the Mohawk River on aqueducts, contains a number of double-lift locks, and is considered one of the most scientific canals in the world.

ERITREA (ĕ-rĭt'rē-ạ), or **Erythrea**, a possession of Italy, on the western coast of the Red Sea, extending as a narrow strip of country about 670 miles along the coast, from Nubia to French Somaliland. The total area is about 88,500 square miles, and the largely nomadic population is 450,500. A resident civil governor is nominated by the king of Italy and is placed under the direction of the Italian minister of foreign affairs. Farming is largely pastoral, its products being butter, meat, and hides, supplied by cattle, sheep, and goats. There are pearl fisheries of considerable importance along the coast, while the import and export trade is quite large. Massowah is the capital and local seat of government; population 9,250. It is connected with Saate and several other points by railroad and telegraph lines. Numerous wars between the Italians and dervishes have occurred, though the boundary line was fixed at its present limit in 1897.

ERMINE (ẽr'mĭn), or **Stoat**, a small mammal allied to the weasel family, found in the northern portion of Eurasia and America. The body in summer is reddish-brown

ERMINE.

above and white beneath, and in winter it is wholly white, except the tip of its tail. Its body is about ten inches long, with the tail about five inches. The fur is soft and silky and used for ladies' winter garments, and in some countries for robes of kings, judges, and other high officials. When used as linings for cloaks, the black tufts of the tail are sewed to the skins at irregular intervals. The ermine lives in holes in the ground and under rocks, and feeds on mice, rats, birds, chickens, and other small animals, sucking the blood.

EROSION (ẽ-rō'zhŭn), in geology, the influence of running water, waves, and wind in wearing away rocks and other substances. Immense quantities of silt are deposited at the mouths of rivers as deltas, which show that the geological structure of the earth's crust is changing from this agency. The erosion theory attributes the excavation of valleys and other depressions chiefly to the erosive power of water in the form of glaciers, instead of regarding them as due to depressions, cracks, or fissures in the strata produced by strains during upheavals through volcanic action.

ERSKINE (ẽr'skin), **Thomas, Lord**, orator and lawyer, born in Edinburgh, Scotland, Jan. 21, 1750; died Nov. 17, 1823. He was the youngest son of the earl of Buchan, educated partly at Edinburgh and partly at the University of St. Andrews, and entered the navy in 1764, though largely at his own displeasure. After serving in the navy four years and in the army seven, he entered upon the study of law at Cambridge, where he took a degree in 1778, and was called to the bar on July 3 of that year. His eminent success led to an election to parliament in 1783 for Portsmouth, which seat he held till he was raised to the peerage in 1806. He defended Stockdale, a bookseller, in 1789 on charges

of libel brought for publishing a pamphlet in favor of Warren Hastings, in which his success in the art of addressing a jury was greatly admired. In 1792 he lost the office of attorney-general to the prince of Wales on account of defending Thomas Paine, when he was prosecuted for publishing the second part of his "Rights of Man," though Erskine maintained the opinion that he deemed it right to defend a case even if not in full sympathy with the convictions and views of his client. The prince of Wales, afterward George IV., made him keeper of his seals for the duchy of Cornwall in 1802, and in 1806 he was made peer and elevated to the dignity of lord chancellor. His speeches are unrivaled in the history of the British bar, and upon them rests his reputation. Among his publications are "View of the Causes and Consequences of the War with France."

ERYSIPELAS (ĕr-ĭ-sĭp′ē-lȧs), an inflammatory disease of the skin. It is attended by fever and diffused redness and swelling of the parts affected, and later by peeling off of the scarf-skin in the milder forms, or by suppuration of the deeper parts in severer cases. There is usually considerable pain, with heat and tingling in the affected parts. The treatment consists for the most part in watching closely the progress of the case, keeping the bowels well regulated, and obviating special dangers as they may occur. Iron is sometimes used as a specific remedy. The disease is frequently an epidemic.

ERZERUM (ĕrz′rōōm), an important city of Turkish Armenia, situated in the southern portion of a wide valley, at an elevation of 6,200 feet, and surrounded by mountains of considerable elevation. It is the capital of a Turkish vilayet, which has an area of 7,000 square miles and a population of 585,675. The streets of the city are angular and the houses largely ancient, though there are numerous fine buildings, bazaars, and public edifices. The manufactures consist largely of ironware, clothing, copper, fabrics, and utensils. Erzerum forms an important strategical center. There is a considerable trade with many points in western Asia, and the Persian pilgrims gather there in large numbers when on their way to worship at Mecca. In 700 A. D. it fell into the hands of the Arabs, and was later successively conquered by the Byzantines, Mongols, and Turks. The Russians took possession of it in 1829 and again in 1878, though later restored it to the Turks. The governments of Germany, France, Russia, and England maintain consul residences and are represented officially. Population, 65,800.

ERZGEBIRGE (ĕrts′gẹ-bēr-gẹ), a range of mountains in Europe, trending a distance of 120 miles and forming a natural boundary between Bohemia and Saxony. The name in German means "Ore Mountains," and was given because of their wealth of iron, copper, cobalt, lead, silver, coal, and arsenic. The culminating peaks in Germany attain a height of 3,850 feet.

ESARHADDON (ē-sar-hăd′don), a celebrated king of Assyria, son and successor of Sennacherib. He reigned from 680 to 667 B. C., during which time he became distinguished as a general and an organizer. His father had destroyed Babylon in 691 in the Babylonian wars, but Esarhaddon rebuilt it, making it his southern capital, and greatly extended his dominion. He conquered the country west as far as Cyprus, attained large possessions in Media, and made himself king of Egypt and Ethiopia. Later Manasseh, king of Judæa, was conquered and carried captive to Babylon.

ESAU (ē′sȧ), the founder of the Edomites, eldest and favorite son of Isaac, and twin brother of Jacob. He was a rough, cunning hunter, and seems to have cared nothing for the morrow, but lived in joyous carelessness from day to day. It is recounted that he allowed Jacob to defraud him out of his birthright for a dish of pottage, even though it carried with it the covenant-blessing and many temporal advantages. When he learned that Jacob had deceived him, he vowed his destruction, and the latter was sent to live with his uncle, Laban, in Padan-aram, for safety. Esau married two Canaanitish women, and later his cousin Mahalath, and established himself in the region of Mount Seir, in Palestine. He afterwards became reconciled with his brother Jacob, who had returned home to the burial of his father.

ESCANABA (ĕs-kä-nȧ′bȧ), a city in Michigan, county seat of Delta county, near the central part of the northern peninsula of the state. It has a good harbor on Green Bay, is well connected by railroads, and is an important shipping point. The annual shipments of Lake Superior iron ore aggregate about 500,000 tons. Among the manufactories are mills, iron foundries, and woodenware factories. There are fine county

ESCAPEMENT.

buildings, good schools and churches, electric railways, electric lights, and waterworks. Population, 1904, 11,098.

ESCAPEMENT (ĕs-kāp′mẹnt), a mechanical device intervening between the power

and the time-measurer of a clock or watch, and whose purpose is to secure uniformity in the rate of movement. It consists of two principal parts, the escapement wheel a and the lock d j, and through these the power imparts to the pendulum c, or balance-wheel (time-measurer), an impulse sufficient to overcome the friction and resistance of the atmosphere, and thus keeps up the vibration. These alternate motions of the lock serve to arrest and release the escape wheel at uniform intervals, thus governing the movement of the timepiece. Among the different escapements in use are the chronometer, anchor, lever, cylinder, duplex, and horizontal.

ESCOBEDO (es-ko-bā′do), **Mariano,** Mexican soldier, born in Galeana, Nuevo Leon, Jan. 12, 1827. In 1847-48 he became celebrated on account of arming large numbers of Mexicans and attacking the United States forces engaged in the Mexican War, though later he fought with the Mexican army at Palo Alto. He is known also by his daring exploits during French interference in Mexican affairs in 1862, and his resistance to the imperial general, Miramon, in 1867. The latter resulted in the capture of Emperor Maximilian, and his shooting after a hasty court-martial. Escobedo was secretary of war under President Lerdo, and opposed Diaz, which resulted in his arrest and trial by court-martial, though he was allowed freedom. In 1882-83 he held the office of president of the supreme military court of justice, but resigned in 1884 to retire from public life.

ESCURIAL (ĕs-kū′rĭ-ạl), a building about thirty miles northwest of Madrid, Spain, celebrated as a palace, church, convent, and burial-place. It was built by Philip II. on a slope of the Sierra Guadarama, about 3,700 feet above sea-level, and dedicated to St. Lawrence in commemoration of the victory of St. Quentin over the French on St. Lawrence's day, Aug. 10, 1557. Since St. Lawrence suffered martyrdom by being broiled to death on a sort of gridiron, its form is considered to be on the plan of a gridiron. The main building was begun in 1563 and completed after twenty-one years. This great building has a length of 740 feet, a width of 580, and a dome with a height of 220 feet. Its collection of pictures long ranked among the finest in Europe, but large numbers of the more noted were transferred to Madrid in 1837. A fire injured the library in 1691, but Ferdinand VII. restored it, and in 1808 the French army inflicted damages to the masonic portion. Marble tombs contain the remains of all the kings of Spain from Charles V. to Alfonso XII., except Philip V. and Ferdinand II., the tombs being in tiers over each other in niches constructed in the walls. A bolt of lightning struck the Escurial in 1872, by which serious damage resulted.

ESDRAELON (ĕs-drạ-ē′lŏn), also known as the Plain of Jezreel, a fertile valley of Palestine, extending from the Mediterranean towards the Jordan, along the eastern side of the Carmel range. It is drained by the Kishon River, and noted for its present high state of cultivation, though prior to 1869 it was laid waste periodically by the Arabs. This valley is the site of Gideon's victory over the Midianites, and that of Napoleon over the Turks in 1799.

ESKIMOS (ĕs′kĭ-mōz), or **Esquimaux,** a race of people supposed to be of Turanian descent, found native in the northern part

ESKIMOS.

of North America, Greenland, the Arctic islands, and the northeastern portions of Asia. The name applied to them is supposed to be of Indian origin, meaning "eaters of raw fish," though the designation they apply to themselves is Inu-it. There are at least three principal divisions of this race—the Eskimo proper, in Labrador; the Greenlanders, and those occupying the regions west of Baffin Bay and extending westward along the Arctic region to a district about 400 miles west of Bering Strait. Their height and coarse, black hair correspond to those of the American Indians, but the color of the skin shows a tendency toward brown. The eyes are often oblique, cheek-bones prominent, nose flattened, and the weight quite large considering the average height. Their summer residence consists of tents made with poles and skins.

In the winter time the Eskimos build houses of snow and ice, though in some cases their habitations are permanent, being constructed of stone in which turf is used for cement. The food consists of the flesh of the walrus, whale, seal, and other animals, though this is usually eaten raw. From fifty to several hundred inmates occupy a single house, which in the winter time is warmed by lamps consuming whale-oil as fuel. The attire of the males and females is similar, consisting of trousers and a coat or sack, with a hood of skins drawn over the head. Government among the Eskimos is tribal; the oldest are selected as chiefs, who officiate among the tribes and groups of tribes. Large numbers have been converted to Christianity by Danish missionaries, though some still pursue totem worship. As

hunters and fishers they show much skill with spears, arrows, and lances, these usually having bone or metal points. The Eskimo dog is their only domestic animal, and serves as a valuable help in hunting and drawing sledges. It is larger than the English pointer, and has short but strong legs, and from its bushy tail a wolfish appearance. By means of a team of trained dogs the Eskimo is able to travel sixty miles a day. The total number of Eskimos is now placed at 45,000.

ESSEN (ĕs'sĕn), a city of Germany, in the kingdom of Prussia, about twenty miles northeast of Düsseldorf. Though its prosperity is recent, it dates from the 9th century, contains a fine church erected in 873, and is the center of much industrial activity. Numerous railroads and electric car lines connect it with cities at a distance. The streets are well paved and its architecture durable and imposing. Among its industries is the celebrated Krupp steel and iron works, rated among the most extensive establishments in the world. These works were founded with only two workmen in 1827, but at present occupy a site of 1,000 acres and give employment to 22,500 workmen. The guns, steel plate, and munitions of war produced at this establishment have found their way to all the civilized countries. In these works are 2,000 furnaces, 300 boilers, 100 steam hammers, and 400 steam engines. In the daily activities 2,800 tons of coal and coke are consumed, and about 600 tons of iron produced. A steam hammer weighing 150 tons is utilized in constructing the heavier implements of war. The city has excellent schools, libraries, public parks, and scientific societies. Besides the Krupp works, there are manufactures of vinegar, clothing, tobacco, machinery, fabrics, and beverages. Population, 118,985.

ESSEX (ĕs'sĕks), **Robert Devereux, Earl**, born in Herefordshire, England, Nov. 10, 1567; executed Feb. 25, 1601. He was schooled at Cambridge, entered military service in the Netherlands under his stepfather, the earl of Leicester, and attained the special favor of Queen Elizabeth, who showed him many distinguished honors. Later he was sent to assist Henry IV. of France against the Spaniards, and rose rapidly to privy chancellor, earl, marshal, and chancellor of Cambridge. His activities led to the capture of Cadiz in 1596, but his expedition in the following year was not successful and led to a quarrel with the queen, in which he turned his back upon her and she promptly boxed his ears. Essex becameso excited that he drew his sword, threatening the life of the queen; the two were never really reconciled. In 1599 he was appointed lord-lieutenant of Ireland, and, after failing in satisfying his constituents, he led a band of 300 men to rid the country of Elizabeth's counselors, but especially those opposed to him personally. Being disappointed in realizing general support, he was captured, tried for treason, condemned, and beheaded. For some time Elizabeth showed unwillingness to sign his death warrant, expecting him to implore her pardon, but his pride and dignity prevented this. He was a friend of literary men, gave an estate to Bacon, erected a monument to Spenser, and contributed some productions in poetry to English literature.

ESTHER, meaning a star, the Persian name of Hadassah, daughter of Abihail, and foster-daughter of Mordecai, an officer of the Persian king, Ahasuerus. When the misconduct of Vashti had resulted in the loss of her royal estate, all the fair young virgins appeared before Ahasuerus that he might choose a successor. He selected Hadassah, who received the name of Esther on account of her loveliness. She saved the Jews, her people, from the horrors of a universal massacre, had Haman hanged, and Mordecai made chief next to the king. These events took place during a feast, which is still observed by the Jews in the month of Adar, known as the feast of the Purim. Profane history does not speak of Esther or Ahasuerus, but the general opinion is that Ahasuerus was Xerxes, and Esther not his wife, but the favorite of his harem. The story is told in the book of Esther, probably written by Mordecai.

ETHELRED II. (ĕth'ĕl-rĕd), king of England, son of Edgar, attained the throne in 978 as successor of his brother, Edward the Martyr. He was called the Unready, on account of a want of vigor and capacity. His reign was marked by numerous incursions of Canute, the Danish king. See **England**.

ETHER, in astronomy and physics, the tenuous fluid that fills all space, and regarded the medium for the transmission of light, heat, and electric action, through the molecules of solids and liquids as well as throughout all gases. This medium is thought to be more elastic than any ordinary form of matter. Electric and magnetic phenomena are but strains and pulsations in the ether. Physicists assume the existence of ether from the wave theory of the motion of light (q. v.). In chemistry ether forms a very light, volatile, inflammable fluid made by the distillation of methyl alcohol and strong sulphuric acid. It is colorless, transparent, possesses a fragrant odor, a fiery, passing to a cooling, taste, and, when mixed with oxygen, gives rise to a dangerous explosive. Ether is one of the best solvents for oils and fats; is also used in the solution of iodine, sulphur, phosphorus, strychnine, and other alkaloids. It is useful in the preparation of freezing-mixtures. When inhaled, it produces intoxication, and was formerly used as an anæsthetic.

ETHICS (ĕth'ĭks), or **Moral Science**, the science that relates to human duty. It investigates the nature and the right of con-

duct, actions and aims, embracing the supreme good and the ultimate ground of obligation. Writers usually treat the science of ethics under two divisions—theoretical and practical. Theoretical ethics aims to ascertain the principles of the ideal moral manhood and life, while practical ethics applies these principles in directing man to the attainment of the ideal character and life. Ethics as a science is frequently compared in various aspects to geometry. In geometry we have an intuitive idea of extension; then special forms of extension, as a line, a circle, etc.; and finally we arrive at intuitive truths called axioms. Similarly, in ethics we first have an intuitive idea of right; then an idea of particular forms of right, as kindness, honesty, etc., and ultimately recognize certain principles, as "it is right to be kind," "it is our duty to be honest," which may be regarded moral axioms. Various systems of ethics have been proposed, all differing more or less widely in their conclusions as to the origin and nature of the faculty by which human duty is recognized. Many of the systems had their origin in antiquity, and with them the names of Socrates, Plato, Epicurus, Aristotle, and the Stoics are associated. With the introduction of Christianity ethical speculation turned on a new element, and among Christians moral obligation came to be based on the injunctions of the Scriptures.

Most modern writers regard the true, the beautiful, and the good as the three rational ideas of the mind, and of these the good, which is by some called the right, is held to be the highest idea. There has been a wide difference of opinion as to the question of right, the essential query being as to what it is that makes a thing right. Among the answers proposed are utility, highest happiness, divine law, the divine nature, and the eternal nature of things. Those holding to the view founded on utility urge that whatever is best adapted to the welfare of man is right, while the opposite things are regarded as wrong, because they retard the individual and the race in progress toward the ideal life. Those holding that right is based on the highest happiness of the individual similarly commend all that is essential to the happiness of man. By divine law is meant the revealed will of God, which some writers hold to be the ultimate right, but there is a wide difference of opinion as to what the revealed will of God is, which is also the case of the character of divine nature. Those holding that right is based on the very nature of things regard right and wrong as self-existent; that they have no origin, and that they are eternal. The view that right and wrong are eternal principles is probably correct, since we cannot conceive a condition under which either can change or be terminated. Viewed from this aspect we conceive that right is wrapped up in the universe, one ever-existing ultimate principle.

Locke, in his "Essay on the Understanding," assailed the theory that morality is intuitive, and urged that there are no principles universally received among men; that children are not possessed of any moral rules, and that moral rules require a reason to be given for them, these all being conclusive that virtue is not innate. In reply to this view, writers have urged that all nations agree in enjoining some moral rule, but this is a departure from the original question, since we are to determine which of any opposite standards of morality is correct, as, for instance, monogamy or polygamy. Those who oppose the idea of innate virtue usually hold that the idea of right is the product of education. According to this view virtue depends wholly upon the manner of instruction, which also determines how the individual will class conduct in the categories of right and wrong. Others hold that education does not account wholly for the origin of the idea, but refer its development at least partially to instinct. In the philosophy of Kant, reason is held to recognize the obligation of right conduct, and action is classed as good only when it is done from a good motive, though the motive must be entirely freed from natural inclination to the act performed. Adam Smith, in his "Theory of Moral Sentiments," suggests that the sympathetic feelings of the impartial and well-informed witness of an act constitute the criterion of right, while William Paley (1743-1805) held that virtue consists in doing good to mankind for the sake of everlasting happiness.

ETHIOPIA (ē-thi-ō′pĭ-a), the Kush of sacred history, the ancient name applied to all the nations inhabiting the southern hemisphere, as known in early ages. The name was also applied to the dark-brown or black-colored people, who are generally spoken of as Ethiopians, meaning "sunburned." Later it applied particularly to the country lying south of Egypt and the Red Sea, which corresponded to modern Abyssinia, Nubia, Kordofan, and other districts, though the boundary was not clearly defined. It was also applied to an island formed by two tributaries of the Nile, known as the kingdom of Meroë, whose capital was Napata. This island was fertile, producing an abundance of cereals, animals, and metals. It was also given credit as the site of an oracle of Jupiter Ammon. Its trade with Egypt, Libya, Carthage, Arabia, and even India was important, but it attained its greatest prosperity about 1000 B. C., and formed a distinguished and powerful kingdom of ancient history. About the middle of the 8th century B. C. it became independent of Egypt, secured a predominating influence in the valley of the Nile, and imposed a dynasty on Lower Egyypt.

The Persian Cambyses invaded Ethiopia in the 6th century B. C., though independence was maintained until it became a pos-

session of the Romans in the reign of Augustus, the Ethiopian queen, Candace, becoming one of his vassals. The only evidences remaining of the ancient civilization of Ethiopia are numerous ruins of monuments and temples on which battles, religious ceremonies, and the industries are represented by sculptures. Their first king was Menelihek, who is supposed to have been the son of Solomon and the Queen of Sheba. The names of thirty kings and queens have been found sculptured on some of the ruins. Later the country came to be known as Abyssinia, but the monarchs of the present Abyssinia still designate themselves rulers of Ethiopia. The language of the Ethiopians, more correctly called the Geez language, was introduced from South Arabia, and formed the ancient ecclesiastical and official language of Abyssinia. Semitic in construction, it resembles the Hebrew, Aramaic, and Arabic. The modern nomadic tribes of the Soudan and Tigre speak a language quite closely allied to it. The literature of the Ethiopian language includes a translation of the Old and New Testaments and the Apocrypha, besides other important Christian literature.

ETHNOLOGY (ĕth-nŏl'ŏ-gy), the science which treats of the various races of mankind, investigates their distribution and attempts to trace them to their origin. The science was developed from ethnography, which relates to particular tribes and localities, and to which it has a relation similar to the connection between geology and geography. Anthropology is the general science or natural history of mankind, of which ethnology and ethnography are important branches, while anthropology again is a branch of biology. In this article we can give only the leading facts of the unity or plurality of the species of mankind, since the whole study covers a wide range of details to be investigated. The distribution of man is much more general than that of lower animals, owing to the greater power of adaptation to change of circumstances. On account of this, man is found in all climatic zones, and at all elevations above sea-level, except only the small areas above the snow-line.

The view that all mankind descended from a single family or species is the one most commonly supported. This view holds that Adam and Eve were the first parents, the common progenitors of all, racial differences now existing being attributed to climatic influences acting on individual families for a long period of time. Another view is that the various types have not descended from a single family, but were created separately in different localities, advocates of this theory maintaining that the physical form, personal characteristics, and general appearance of mankind could not have been so greatly diversified as the different races show by mere climatic conditions. However, the difference in color, stature, size, and intelligence is largely overcome by the anatomical structure, which is invariably the same in all races. Besides, the racial differences are characterized by almost insensible gradation, which points to a gradual modification of an original race through changes in external circumstances, by means of which the principal varieties were produced. According to this view it is taken that all the varieties of races have descended from the Caucasian. Other evidences pointing to a single parent family are found in the similarity of earlier myths and legends, from which it is taken that the remote ancestors of the various races originally dwelt together. There is also a close resemblance of the language of widely separated races, this being regarded the strongest proof of the early unity. By extended comparisons many scholars have been led to believe that the languages had their origin in the one parent nation, which dwelt in the neighborhood of Mt. Ararat in prehistoric times.

Various classifications of mankind have been attempted. However, it has been difficult to find physical characteristics that belong exclusively to a single race, though there are some that predominate in certain races. The Dutch anatomist, Pieter Camper (1722-89), attempted to make a scientific racial distinction by measurement of the facial angle. Though Camper's method illustrates nicely existing differences, they may be paralleled quite as distinctly by variations found in a single community. He classifies, for instance, the facial angle of the anthropoid apes at 42°, the African Negro at 70°, and the Europeans at 80°. J. F. Blumenbach (1752-1840), a German enthnologist, classified the human family into five races, basing the distinction on the differences found in the shape of the head, while Cuvier classified mankind in three divisions. As classified by this writer, the races are Caucasian, Mongolian, Ethiopian, Malay, and American, the latter two being considered by him as sub-divisions of the Mongolian. There is a more recent classification into three strongly marked types, the Caucasian, Mongolian, and Negro; and the three secondary races, the Malay, American, and Australian.

The Caucasian race is found in southwestern Asia, most of Europe, America, and is widely distributed in small colonies in other portions; the Negro type most largely in Africa; and the Mongolian in portions of Eurasia not occupied by the Caucasian. Among the chief characteristics of the Caucasians are a round, oval face, fair complexion, arched forehead, symmetrical features, vertical teeth, smooth hair, and ample beard. The Mongolians have an angular face, broad head, oblique eyes, straight, coarse, black hair, high cheek-bones, pale lemon to brownish-yellow skin, and a scanty beard. This race includes the inhabitants of most of Asia, the Laps and Finns of

northern Europe, the Magyars of Hungary, and the Turks. The Eskimos, who inhabit the northern portion of North America and northeastern Asia, are also classed with this race. The Negro race is characterized by a narrow and elongated head, projecting jaws, thick lips, crisp, curly hair, black or dusky skin, scanty beard on upper lip, and broad feet. It shows great differences in civilization, ranging from the cruel and vindictive Gallas to the debased Hottentots; from the cringing slave to the most profound and enlightened scholars. This race is found in large numbers on the continent of Africa, and has migrated to all portions of the warmer zones. The Malay race resembles the Mongolian; however, the eyes are horizontal, the hair coarse and straight, and the skin is mostly a dark olive color. It is found in large numbers on the island of Madagascar, the southern Malay peninsula, and the islands of the Indian and Pacific oceans.

The Australian race is considered a subvariety of the Papuan branch of the Malays. It is characterized by deep-set eyes, large head, abundant beard, dark hair, and dark-brown skin. In civilization it is wholly destitute and has shown little, if any, tendency to improve under a system of education. The American race resembles the Mongolian in some respects, though it is characterized by the top of the skull being more rounded and the sides less angular. This race once occupied all of America, though since the discovery and settlement it has been more or less assimilated. This is true especially of South and Central America, where the most highly advanced tribes of this race were found. At the time of discovery of America the people of the Andean plateaus were advanced in civilization, understood the art of working metals, and possessed remarkable temples, tombs, aqueducts, and pyramids; while those of Central America showed evidences of a still higher and more ancient civilization. The former probably were of Asiatic origin, while the latter have been traced by some writers to a Semitic or an Egyptian source. Placing the entire population of the earth at 1,500,000,000, the numerical strength of the different races is as follows: Mongolian, 650,000,000; Caucasian, 575,000,000; Negro, 175,000,000; Malay, 40,000,000; American, including all of the red race, 20,000,000; Australian and mixed races, 40,000,000.

ETNA, or **Ætna**, the most celebrated volcano in Europe, situated in Catania, Sicily, towering 10,865 feet above sea-level. This mountain rises abruptly from the sea, having a circumference of over one hundred miles at the base, and ends in a single cone, in which a crater nearly three miles in circumference and 1,000 feet deep has been formed. A number of smaller cones are also situated on the side of the mountain, the principal one being Monti Rossi, formed during the eruption of 1669. The mountain contains three climatic zones—the lower mild region, the central temperate, and the upper or snow-covered. In the milder regions many varieties of lemons, oranges, date-palms, olives, almonds, figs, and bananas are cultivated; in the temperate are forests of oak, birch, chestnut, cork-oak, maple, and pine; and in the upper is a desert region covered partly with stunted vegetation and partly with ashes, lava, and sand, and much of it is buried most of the year with snow. A splendid view of the whole of Sicily, Malta, Calabria, and the Lipari Islands is obtained from the summit, and at the height of 9,080 feet is an observatory, forming the highest inhabitated structure of Europe.

Several great eruptions of Mt. Etna occurred long before the Trojan Wars, and are told of only in mythical story. The earliest to which a definite date is given occurred in 475 B. C., and the most remarkable overwhelmed Catania in 1169, when 15,000 persons were destroyed. In an eruption in 1329 a new crater opened; in 1444 the cone formation fell into the crater during an eruption, and in 1669 a chasm twelve miles long burst open and lava flowed over the country for forty consecutive days. An earthquake accompanied the eruption in 1693 and caused the destruction of 60,000 lives. Vast eruptions occurred in 1832, 1853, 1865, 1874, and 1879, and there were numerous minor manifestations of external disturbances, numbering in all about one hundred, fully twenty of which occurred in the last century. Premonitory symptoms generally precede eruptions, thus giving ample warning to the people that danger is imminent.

ETON COLLEGE, an educational institution situated in Eton, England, about twenty miles from London. It was founded by Henry VII. in 1440, though its completion was retarded by political contentions till 1523. The institution is managed by a board or governing body, whose members are nominated by learned electors, including those of Oxford and Cambridge. Students from Eton may obtain valuable scholarships at Cambridge on merit, which is determined by competitive examinations. The buildings are substantial and convenient, and associated with them are libraries, apparatus, a beautiful campus, and several parks. The attendance numbers about 1,000. Its course of study is still based somewhat on the mediæval idea that Greek and Latin are the basis of all good education. Among its distinguished graduates are Fielding, Fox, Chatham, Bolingbroke, Channing, Gray, Hallam, Wellington, Shelley, and Gladstone.

ETRURIA (ē-trōō′rę-ä), the ancient name of the portion of Italy situated west of the Tiber and the Apennines, and occupying properly the valley of the Arno, though extending at one time south of the Tiber, when it included the valley of the Po. For

practical purposes it may be said that Etruria corresponded to modern Tuscany, but included several adjoining regions. The traditional history of the Etruscans begins about 1044 B. C., and its fairly authentic history precedes the foundation of Rome more than two centuries. The state was formed as a confederation of twelve great cities or cantons, each of which constituted a representative republic. Among the most flourishing of these cities were Cortona, Veii, Cære, Volsinii, Tarquinii, and Perusia. Veii was a rival of Rome for four centuries, and in its prosperity covered sixteen square miles, but met destruction under Camillus in 396 B. C. The famous tomb of the Tarquins is located at Cære. Volsinii resisted Roman attacks for many years and constituted one of the most powerful centers of Etruscan strength.

The naval power of the Etruscans was a strong element in their prosperity, enabling them to control large portions of the Mediterranean, establish supremacy over central and northern Italy, and include Rome itself within their territory for several centuries. From them the Romans secured the circus, many arts of industry, architectural methods, and the gladiatorial combats. They formed an alliance with the Carthaginians in 538 B. C. for the purpose of expelling Greek colonists from Corsica; fought against the Greek colony of Cumæ in 525 B. C., and were rated the greatest military power of Italy in 467 B. C., though two years later their strength was partly shattered by the Greeks. Subsequently their territory was invaded by the Gauls, Samnites, Greeks, and Romans. The Roman victory over Veii in 396 B. C. completely destroyed Etruscan power, while their last determined resistance ended at the battle of Lake Vadimonian in 283 B. C. Even after this their state was considered an independent ally of Rome, though Roman customs were gradually adopted until the final union was effected in 89 B. C., after which many of the leading families of Etruria attained to high positions in the Roman government.

The name applied to the people of Etruria by the Romans was Etrusci, while the Greeks called them Tyrrheni. These people constituted a sturdy race, were characterized by black hair, high color, large heads, and more nearly resembled the people of western Asia than the Europeans. Their civilization was marked by culture, a definite literature, codified laws, and a flourishing commerce. Although their poems, dramas, and histories are numbered among the extinct writings of the past ages, we know something of their ability to compound and apply medicine, calculate mathematical and astronomical problems, mine and work metals, build highways, and construct architectural edifices by studying their ruins and deciphering the inscriptions found on monuments and in the tombs. Among the most exquisite of their productions still preserved are numerous vases, lamps, and utensils. It is also known from excavations that their homes were adorned with decorated walls, mirrors, jewelry, pottery, and convenient furniture, though in art they borrowed largely from the Greeks. Many of the exquisitely painted vases known and preserved as Etruscan were undoubtedly the production of Grecian workmen, for the reason that many of the inscriptions are in the Greek. The language of the Etruscans is known as Rasena and was spoken for about 1,000 years before the Christian era, when it gave way to the Latin. Numerous coins and gems bearing inscriptions in Rasena are extant.

ETYMOLOGY (ĕt-ĭ-mŏl′ŏ-jў), that branch of philology which treats of the origin, form, and meaning of words. Numerous Greek philosophers, including Plato, the grammarians of Alexandria, the Roman Varro, and scholiasts of different ages wrote on etymology and traced the origin and history of particular words and forms of language. In more recent times the intense interest given to the investigation of Sanskrit has led to its scientific study. By means of extended investigations language has been classed in groups and families, and the similar and dissimilar words studied from the standpoint of relationship and origin. This has led to a recognition of the fact that the growth of language is not accidental or premeditated, but enlarges or declines under certain laws. In grammar etymology is the division that treats of the parts of speech, their inflections, and the elements of the sentences.

EUBŒA (ū-bē′ą), an island of the Ægean Sea, formerly called Negropont. It is ninety miles long, about thirty broad at its widest point, and is the largest island in the Ægean Sea. The narrow channels of Talanti and Egripo separate it from Greece. Much of the soil is fertile and well wooded, though several mountain peaks rise to a height of about 7,000 feet. Chalcis and Karysto are the principal towns and trading centers. Besides minerals, there are productions of live-stock, cereals, and fruits. It forms a part of the kingdom of Greece. Population, 96,452.

EUCALYPTUS (ū-ką-lĭp′tŭs), a large genus of trees mostly native to Australia, which grow to the remarkable height of 480 to 500 feet, and form one of the most characteristic features of the vegetation in that part of the world. The leaves, instead of having one of their surfaces towards the sky, often grow with each side equally exposed to the light. Many of the species abound in resinous secretions and are known as gum-trees. The bark is thick and hard, containing a large per cent. of tannin. In the red-gum, bay king, and iron-bark species, a red juice flows freely from a wound and hardens into irregular, inodorous, trans-

parent masses called eucalyptin, which is analogous to tannin. The wood is used extensively for shipbuilding. A species of the eucalyptus known as the blue-gum tree has been introduced into Cape Colony, Algeria, the United States, Mexico, Roman Campagna, and elsewhere. It has acquired a reputation for drying marshy soils and absorbing malaria, on account of which it is called the fever-tree. A saccharine substance similar to sugar, a powder having the qualities of quinine, and a secretion resembling manna are obtained from these trees.

EUCLID (ū'klĭd), Greek mathematician, born in Alexandria, Egypt, about 300 B. C. He belonged to the Platonic school of philosophy and taught mathematics in the famous University of Alexandria, in the reign of Ptolemy I., where he made prodigious advancement by his vigorous methods. His "Elements of Geometry," published in thirteen books, has, perhaps, never been excelled. Besides this work, he wrote treatises on music, optics, and astronomy. The texts of the "Elements" have been translated into many languages, and, while they may not be used in their entirety by different schools, they form the basis of all logical mathematical reasoning.

EUFAULA (ū-fạ'lä), a city of Barbour county, Alabama, on the Chattahoochee River. It is a popular winter health resort, has good schools, and is the seat of a college for women. The surrounding country is agricultural and fruit-growing. There are manufactures of cotton goods, vehicles, canned fruit, lumber, and tobacco. Population, 1900, 4,532.

EUGENE (ū-jēn'), **Francois,** Prince Eugene of Savoy, celebrated general, born in Paris, France, Oct. 18, 1663; died in Vienna, Austria, April 21, 1736. Being the son of Eugene Maurice, he was intended for the church, but renounced his country on account of the banishment of his mother by Louis XIV., and entered the service of Emperor Leopold of Austria as a volunteer in the army sent against the Turks. His distinguished services caused his rapid promotion, and in 1693 he was made field-marshal. Four years later he defeated the Turks in the battle of Zenta, by which their power in Hungary was broken. When the Spanish War of Succession broke out, in 1701, he took a command in the army of Italy, but did not achieve much success on account of his force being too small. Shortly after he entered the imperial army of Germany, and, in conjunction with Marlborough, in 1703, defeated the French, and again at Blenheim the French and Bavarians under Marshal Tallard, Aug. 13, 1704. He forced the French to raise the siege of Turin, Italy, the following year, and soon after expelled their forces from Italy. In 1708 he attained much success on the field of Oudenarde against the French, and also at Malplaquet in 1709, though at the latter place he was dangerously wounded. After the recall of Marlborough, the activities of Eugene were somewhat limited, only to break out anew in 1716, when he defeated a Turkish army of 150,000 at Peterwardein with a force of 64,000 men, and in 1717 stormed Belgrade, gaining a decisive victory. After peace was declared, he served with distinction in the cabinet of Austria, attaining as much success in the deliberations of peace as in the activities of war. The popular songs of Austria long did honor to him and his posterity, and history accords him a place among the greatest military heroes of modern times.

EUGENIE (uh-zhā-ne'), **Marie de Montijo,** empress of France, born in Granada, Spain, May 5, 1826. She descended from Spanish and Scotch parents, was educated in Spain, France, and England, and attained to numerous accomplishments. Louis Napoleon, afterwards Napoleon III., first met her in London, when he was there in exile. She went to Paris in 1851 and attracted the attention of the leading families, and on Jan. 30, 1853, married Napoleon. The wedding presents bestowed upon the contracting parties were exceedingly valuable. She expended $12,000 presented to her by the city of Paris for the purpose of endowing a college for women, and used $20,000 of the amount given her husband for charitable purposes. As the empress of France she became a leader of fashion, maintained a brilliant court, and by interferences in politics endeavored to aid in furthering Napoleon's Mexican and papal policy. When Napoleon was in Italy in 1859, she acted as regent, also during his tour to Algeria in 1865, and again when he was at the head of the army in 1870. She fled to England as soon as intelligence of the surrender at Sedan reached her, and was joined there by her son and husband. Her abode in England was first at Chiselhurst, but later at Farmborough. Three years after removing to England Napoleon died, and her only son, the prince imperial, born March 16, 1856, was killed in the Zulu war in South Africa in 1879. He had received a military education in England, and served as a volunteer in the English army, his death causing great sadness to his mother.

EULENSPIEGEL (oi'len-spē'g'l), **Till,** the name of a popular German story-writer, born near Lübeck in the latter part of the 13th century and reputed buried at Mölln in 1350. The book called "Eulenspiegel," meaning Owl's Mirror, so named in his honor, purports to contain his numerous whimsical stories, and is the most popular chapbook of Europe. In it the love of fun is mingled with a profound love of mischief. It was originally written in Low German, but was soon after translated into High German and many other languages.

EUPHRATES (ū-frā'tēz), an important river of western Asia, rising by two source branches in the Anti-Taurus range, in

Armenia. The western branch, known as Kara-su, rises about twenty-five miles northeast of Erzerum and joins the Murad Chai, the eastern branch, some distance to the southwest of that city. The great river is joined by the Tigris at Kurna, and the united streams take the name of Shatt-el-Arab for the remaining distance to the Persian Gulf, into which its waters flow. The total length of the Euphrates is 1,740 miles, and the area of its basin 250,000 square miles. It is navigable about 1,200 miles, though the larger warships cannot safely ascend farther than 125 miles, owing to rapids and shallows. During May and June vast floods are caused by the melting snows on the Taurus and the Anti-Taurus ranges, causing the current to rise in velocity from three to five miles an hour and often occasioning great floods. The Bible mentions the Euphrates as one of the four rivers of the Garden of Eden. In the prosperity of Babylon extensive canals served in irrigating the flood lands. Nebuchadnezzar connected that city by canals with the interior, and converted the flood lands into the most productive district of the ancient world.

EUREKA (ū-rē′ka), the exclamation of Archimedes when he discovered a method of detecting the exact amount of alloy in the crown of King Hiero, the meaning being "I have found it."

EUREKA, county seat of Humboldt county, California, on Humboldt Bay, 225 miles north of San Francisco. It is well connected by numerous railroads, has a good harbor and is a shipping point for lumber. Among the factories are iron foundries, lumber and flouring mills, and machine shops. The surrounding country is agricultural and fruit-producing. The noteworthy buildings include a courthouse, numerous churches, and a number of excellent business blocks. There are good schools, well improved streets, and many municipal facilities. Population, 1900, 7,327.

EURIPIDES (yoo-rĭp′ĭ-deez), celebrated Greek poet, born in the island of Salamis, in 480 B. C.; died in Macedon in 406 B. C. He secured an elementary education, was trained in gymnastic exercises and rhetoric under Prodicus and philosophy under Anaxagoras, and formed a close friendship with Socrates. Writers credit him with completing his first play at eighteen, though the first publication appeared in 455 B. C. The "Peliades" was the first production; the first prize was awarded him in 441 B. C., and the last exhibit made was the "Oretes" in 408. Of the three great Greek tragedians he was the latest and by some thought the most successful, the other two being Sophocles and Æschylus. Socrates held his tragedies in high esteem and visited the theater at every performance of a play written by him, though Aristophanes did not admire him, owing largely to his opposition to introducing practical life into tragedy. He went from Athens to Macedon, where he joined the court of King Archelaus, and remained there until his death. When information of his demise reached Athens, there was mourning in the entire city. The actors on the stage of Sophocles wore mourning, and the Athenians asked that his body might be buried in their city, though this request was refused by the Macedonian king. However, the Athenians built a tomb in his honor on the road to the Piræus and inscribed it with "All Greece is the monument of Euripides: Macedonian earth covers but his bones." A splendid monument was also erected to him by Archelaus in Pella, bearing the inscription, "Never, O Euripides, will thy memory be forgotten." The entire productions of Euripides, according to some writers, included seventy-five, while others accord him ninety-two. His knowledge of human nature, mastery of tragic situations, and skillful grouping of characters have led to a popular praise of his tragedies and made them the favorites of Aristotle, Ovid, Virgil, Horace, Milton, and Browning. There are nineteen extant, as follows: "Rhesus;" "Alcestis;" "Medea;" "Hippolytus;" "Hecuba;" "Heracleidæ;" "Supplicex;" "Ion;" "Hercules Furens;" "Andromache;" "Troades;" "Electra;" "Helena;" "Iphigeneia in Tauris;" "Orestes Phœnissæ;" "Bacchæ;" "Iphigeneia in Aulis," and "Cyclops."

EURIPIDES.

EUROPE (ū′rŭp), a grand division lying north of Africa and west of Asia, and with the latter forming Eurasia. From the standpoint both of history and politics it is the most important of the grand divisions. It is the most densely populated, but is smaller than any one of the others, except Australia. The name is said by some writers to have come from Europa, a mythical person of Greece, who was carried off by Zeus, though other writers attribute its origin to the Phœnician traders, who applied it to the land of sunset, from the word Erebh, meaning darkness. Its northern boundary is formed by the Arctic Ocean; eastern by the Ural Mountains, Ural River, and the Caspian Sea; southern by the Black Sea and the Mediterranean, and the western by the Atlantic Ocean. The extreme northern point is Cape North; eastern, a point in Russia lying about 65° east of Greenwich; southern, Punta da Tarifa, in the Strait of Gibraltar; and western, Cape Finisterre, in the Iberian peninsula. The total area is

3,782,000 square miles, and the population 380,200,000. Among the principal islands of Europe are Ireland, Iceland, the British Isles, Corsica, Sicily, Sardinia, Crete, Malta, the Ionian, and the Balearic Islands. The coast line is indented by numerous bays and seas, giving vast advantages to commerce and providing a coast frontage of about 50,000 miles. There are numerous seas and inland waters, among them Cheskaya Bay, White Sea, and North Sea on the north; on the south are the Caspian Sea, Black Sea, and Mediterranean Sea; while on the west is the expansive Bay of Biscay. The Mediterranean and other seas have arms extending far inland, such as the Adriatic Sea, Ægean Sea, Baltic Sea, and the Gulf of Bothnia. The only extensive lakes are located in the northern portions, the most important of these being Onega and Ladoga in Russia, and Venern and Vettern in Sweden.

The surface of Europe is characterized by a great plain extending from the Black Sea to the White Sea, and occupying the interior from the mountains in the south and west to the Asiatic boundary on the east. Its mountains form several complicated groups belonging to different geological ages, and occupy largely the southern and western portions. The most prominent system extends in a curved line from the Strait of Gibraltar along the Mediterranean to Asia Minor, and continues as the Caucasus Mountains between the Black Sea and the Caspian. This system is highest in the center, where the Alps attain a general elevation of about 12,000 feet, though Mont Blanc is 15,787 feet above sea-level, and forms the highest peak in Europe; Matterhorn and Monte Rose are but little inferior in height. Several ranges extend from the central group, among them the Cevennes and adjoining ranges in France, and the Cantabrian and Pyrenees in Spain, the latter containing peaks over 11,000 feet high. The system extends eastward in two curves to the Black Sea by the Transylvanian and Carpathian, which trend north of the Balkans and Dinaric Alps. North of the Alps are the ranges lying between the valleys of the Upper Danube and Oder, and the different chains extending through Austria-Hungary. The mountains in the Scandinavian peninsula extend from the southern point of Norway to the Arctic Ocean, a distance of about 900 miles, the highest summit being about 8,000 feet. These ranges include the Kjolen and several broad plateaus that descend abruptly into numerous deep-cut valleys called fiords, and which are penetrated by the sea almost to the heart of the plateaus. The Ural Mountains extend along the boundary between Europe and Asia, in the north, and some distance to the west of the boundary in the center, trending on a line almost parallel to the meridians, and terminate in a plain north of the Caspian Sea.

The northern lakes of Europe are frozen the greater portion of the year, but the lakes of the south, though small, are noted for their service to man and form a basis for inland commerce and valuable fisheries. The most important of these are located near the Alps. Those south of the Alps are Iseo, Como, Garda, and Lugano; those on the north include Lakes Thun, Geneva, Zurich, Lucerne, Neuchatel, and Constance. Most of the rivers flow in a southeasterly direction, and have their source either in the great central plain or in the mountains of the central west. The four largest rivers rising in the Alps are the Danube, Rhine, Po, and Rhone. Of these the Po flows into the Adriatic; the Danube into the Black Sea; the Rhine into the North Sea, and the Rhone into the Mediterranean. These four rivers have large deltas. The central plain is drained towards the northwest by the Dwina and Petchora into the Arctic; by the Oder, Vistula, Duna, and Nieman into the Baltic, and by the Rhine, Weser, and Elbe into the North Sea. Towards the south and east it is drained by the Dnieper, Don, and Dniester into the Black Sea and the Sea of Azov, and by the Ural and Volga into the inland basin of the Caspian. There are numerous rivers in all the peninsulas, the most important of these being the Tagus, Douro, and Gaudiana in Spain and Portugal; the Po in Italy; the Loire, Seine, and Garonne in France; the Ebro and Guadalquivir in Spain, and the Glommen in the Scandinavian peninsula.

The climate of Europe is peculiarly genial, though it is marked by periods of extreme cold in the north. The shores are exposed to the warm winds and warm oceanic currents from the southwest, by which the temperature is moderated and rendered favorable to the development of plant and animal life. As we proceed east the extremes of temperature become greater, the summer being hotter and the winter showing greater cold. The most favorable effects of the oceanic currents are those experienced on the British Isles and the Scandinavian peninsula, in fact these otherwise would be almost uninhabitable. Northern Russia and the extreme north of the Scandinavian peninsula lie partly within the Arctic zone, and correspond in temperature to the extreme northern parts of North America. Valuable forests of fir, birch, oak, elm, olive, and other varieties abound in their respective zones, while all grades of agriculture are pursued with success. In the southern portions thrive many varieties of fruits, such as lemons, oranges, vines, olives, almonds, peaches, and others, while far into the north the hardy varieties are cultivated extensively.

Cereals of all kinds thrive in the various portions that have a suitable climate, the most productive regions being found in western Russia, Germany, Austria, France, and the valleys of the various mountain systems.

ARCTIC OCEAN
White Sea
Gulf of Bothnia
ATLANTIC OCEAN
NORTH SEA
BALTIC SEA
English Channel
BAY OF BISCAY
Sea of Azov
BLACK SEA
CASPIAN SEA
ADRIATIC SEA
Strait of Gibraltar
MEDITERRANEAN SEA
EUROPE
(Relief)
SCALE
0 100 200 300 400 500
470 Statute Miles to one inch
Dark Brown indicates highest land
Dark Blue indicates deepest water

All kinds of plants common to the temperate zone have been acclimated, and domestic animals form a valuable portion of the annual production. Wild animals are extremely rare, except in the northern part and in regions under government protection. Those abounding more or less at present are fallow deer, porcupine, lynx, bear, fox, wolf, roebuck, ibex, elk, stag, reindeer, and a small number of oxen and bison. The fisheries are valuable, especially those bearing cod, anchovy, salmon, mackerel, herring, and tunny. It is to be noted that the people of Europe are among the most active in the building of vast railroad systems, commercial and educational centers, canals, breakwaters, and in rendering the resources of nature fitted for the enjoyment of life and the reasonable and proper service of man. The vast coast line, numerous navigable streams, and valuable mineral deposits have been convenient instruments in leading to wholesome results. Tin, petroleum, quicksilver, silver, copper, gold, coal, petroleum, iron, and lead are found more or less distributed, besides others equally valuable in the markets of the great European trade centers.

The people of Europe belong to various races and are greatly intermingled in most of the states. At an early history the Celts occupied the region from the Alps to the British Isles, but they were driven westward by successive waves of migration under the

LATIN.

SAXON.

Roman conquests and the insurrections of the Germanic tribes until they were pressed largely to the extreme west, or were assimilated by the most powerful divisions of the Germanic people. The Celtic language is represented at present only by the Gaelic in the islands of Scotland, the Irish in portions of Ireland, the Cymric in Wales, and the Armorican in Brittany. Next eastward we find the Teutonic races, comprising the Germanic and Scandinavian divisions. In the former the Germans, Dutch, and English are included, while the latter comprise the Danes, Norwegians, and Swedes. Farther east the Slavonians are mixed with the Teutons to a greater or less extent. The different branches comprise the Russians, Poles, Bohemians, Czechs, Servians, Croatians, and other minor branches. The Greek and Latin people occupy the south and southwestern parts of Europe; the divisions of the latter are the French, Spanish, Portuguese, and Italians. All the peoples named above are of the Aryan or Indo-European family.

Besides, the Mongolian race is represented in Europe by the Turks, Magyars, Lapps, and Finns, all these having emigrated into Europe within comparatively recent times and secured a foothold by successive conquests or friendly terms of settlement. There is also a considerable number of Basques, who are thought to belong to the Turanians. Owing to the great mixture of the population it is difficult to classify them on a racial basis; the better way is, perhaps, to base the classification upon languages. By this test it is found that the Teutonic language is spoken by 125,000,000; the Slavonian by 110,000,000; the Roman by 114,000,000; the Letts and Lithuanian by 3,000,000; Armenian by 1,150,000; Greek and Albanian by 5,450,000; Celtic by 3,600,000; and the non-Aryan by about 18,000,000. Each of the languages has numerous dialects, though the number of distinct forms is about fifty.

The Christian religion prevails almost exclusively, the only exceptions being the Jewish in widely distributed but minor communities, and the Mohammedan in Turkey. In the western part of the grand division various sects of the Protestant and Roman Catholic religion prevail, while the Greek Catholic is the predominating religion of Greece and Russia. The political divisions comprise the republics of France, Switzerland, and Andorra; the absolute monarchies of Russia and Turkey, and the limited monarchies of Austria-Hungary, Belgium, Bulgaria, Denmark, Germany, Britain, Greece, Italy, Montenegro, the Netherlands, Norway, Sweden, Portugal, Spain, Roumania, Servia, and several minor states, including Monaco, San Marino, Bosnia, Herzegovina, etc.

It is quite certain that Europe was first peopled by successive waves of migration that moved westward from Asia, each pressing the weaker farther and farther westward towards the Atlantic Ocean. The date of these great movements is unknown, though their occurrence is evidenced clearly by the present and past settlements in the European countries. Writers generally agree that authentic history dates in Greece from about 776 B. C.; all earlier periods are estimated from circumstantial evidence. The most successful period of Greece is assigned to about 430 B. C., and this date marks approximately the time when all colonies pressed westward. Grecian education moved to Rome, and that great nation conquered Greece, Spain, Gaul, Helvetia, Illyria, Dacia, and portions of Germany and Brittany about the commencement of the Christian era. Roman extension carried superior laws, greater industrial activities, and social advancement to the regions conquered, and by its theory of government provided favor-

able conditions for the spread of Christianity. The northern nations migrated extensively shortly after the Roman Empire began to decline, and paved the way for great commercial and educational activities in the northwest. These movements were accompanied by the settlement of the Anglo-Saxons in South Britain, the Franks in France, the Lombards and Ostrogoths in Italy, and the Visigoths in Spain, who by superior arts rendered the original inhabitants subject to their institutions or became assimilated with them.

A great Germanic empire was established under Charlemagne in 771, and after the decline its territory was organized into the kingdoms of Germany, France, Burgundy, Italy, Lorraine, and Navarre. These movements were followed shortly by the populations of eastern Europe establishing themselves in regions now more or less influenced by their occupation. The most prominent movements among them were directed towards establishing kingdoms in the north of Germany, Bohemia, Russia, and Poland, while the Magyars invaded Hungary and the Normans established principalities and governments in France, England, and various regions of the southeast. The Christian Crusades, organized to rescue Jerusalem from the Mohammedans, exercised a wonderful influence on the habits and learning of the western peoples, while the Turkish conquest of Constantinople, in 1453, distributed the Greek teachers and philosophers throughout western Europe. This caused a great impetus in the revival of learning, led to the invention of printing, and ultimately to the Reformation. Spain became the most powerful nation shortly after the discovery of America; France soon after rose to a high plane of influence, and the territories of Prussia and Russia were greatly enlarged and the sphere of their power widened. A vast emigration to America more or less affected all the countries that had become over-populated; led to several wars, and was followed by the French Revolution, the Napoleonic wars, the dissolution of the German Empire, and the colonial development of several nations. Among the more recent events in European history may be enumerated the independence of Greece; the absorption of Poland by several states; the unification of Italy; the consolidation of Germany into an empire; the establishment of the French Republic, as a result of the Franco-German War; the curtailing of Turkish influence by the independence of Bulgaria, Roumania, Servia, and Montenegro, and the war of 1897 between Greece and Turkey.

EUSTIS (yoos'tis), **James Biddle**, soldier and statesman, born in New Orleans, Louisiana, Aug. 27, 1834; died Sept. 9, 1899. He descended from a creole family, received a classical education, and graduated at Harvard Law School in 1854. Subsequently he practiced law in New Orleans, but at the outbreak of the Civil War entered the Confederate service as judge-advocate of the staff of General Magruder and was transferred to the staff of General Johnston in 1862, with whom he remained until the war closed. Soon after he resumed the law practice, was elected to the lower house of the Louisiana legislature in 1872, and served in the state senate in 1874-78. The democrats elected him to the United States senate in 1876, but he resigned three years later to accept the chair of civil law in the University of Louisiana and was re-elected to the senate, where he served from 1885 to 1891. President Cleveland appointed him ambassador to France in 1893, in which capacity he served with dignity and activity for four years. While residing in Paris he translated Guizot's "General History of the Civilization of Europe" from the French.

EVANS, Oliver, inventor, born in Newport, Delaware, in 1755; died April 21, 1819. He invented the first steam road-carriage ever worked in America, the high-pressure steam engine, and the automatic flour mill. In 1797 he wrote "Miller and Millwright's Guide" and "Young Engineer's Guide."

EVANS, Robley D., United States naval officer, born in Virginia in 1846. He served with distinction in the Civil War, was promoted to a captaincy in the navy in 1893, and the following year secured command of the cruiser New York, and soon after of the battleship Indiana. In March, 1898, he was placed in charge of the battleship Iowa, which command he held during the Spanish-American War, and distinguished himself by taking a prominent part in the battle fought off Santiago, July 3, 1898.

EVANSTON (ĕv'ănz-tŏn), a city of Illinois, in Cook county, about twelve miles north of Chicago, with which it is connected by numerous railroads and electric car lines. Among its beautiful buildings are several churches, private residences, city hall, and public schools. The municipal facilities include street railways, pavements, waterworks, and a fine system of lighting. It is the seat of the Northwestern University and the Garrett Biblical Institute; it also has a college for young women. Population, 1900, 19,259.

EVANSVILLE, an important city of Indiana, county seat of Vanderburgh county, on the Ohio River, about 160 miles northeast of St. Louis. It has numerous railroads, several steamboat lines, and a fine electric street car system. Among the manufactories are flouring mills, iron foundries, furniture factories, cotton mills, saw mills, breweries, and machine shops. The annual product of the factories is valued at about $13,500,000, while usually about 7,800 hands are employed. There are separate schools for whites and Negroes, each terminating in a fine high school course. The city has a fine courthouse, several libraries, and enjoys

EUROPE

(*Political*)

SCALE

0 100 200 300 400 500

470 Statute Miles to one inch

Capitals of Countries ★ Other Cities.

Comparative Area

KANSAS

82,080 sq. miles

a growing trade in cereals and merchandise. The surrounding country is agricultural. Splendid veins of bituminous coal are found at a convenient distance from the city, about sixty-five coal shafts being operated within a radius of thirty miles. Population, 1900, 59,007.

EVAPORATION (ē-văp′ō-rā′shŭn), the conversion of a liquid or solid by heat into vapor. Some solids, such as arsenic and camphor, pass into a state of vapor and are said to be sublimated. The rapidity at which evaporation proceeds depends upon the extent of surface exposed, for the reason that it takes place at the surface; the quantity of the same vapor already present in the air, because when the air is saturated no more of the liquid can evaporate; on the removal of the air, because evaporation ceases when the air over the liquid is saturated; on the temperature, because warm air can hold more vapor than cold air; and on the pressure on the surface, since diminished atmospheric pressure increases the rapidity of evaporation. From every water surface and even from masses of ice and snow there is constantly arising, at all temperatures, an invisible vapor. A volatile liquid, when placed in a vacuum, rapidly evaporizes without external heat. If a drop of such liquid be passed into the empty space above the mercury of a thermometer tube, it disappears by changing into vapor. When the vapor more than fills the vacuum, the mercury is depressed, thus showing that it possesses tension. If more liquid be passed into the tube, it reaches a point when no more can be evaporated, but simply floats on the top of the mercury. The vapor is then at its greatest tension and the space it occupies is said to be saturated.

The pressure remaining the same, there is for every liquid a certain temperature at which it boils. After it boils, all the heat it receives is rendered latent, and it can never be raised above that temperature while its vapor is allowed to escape. When vapor loses heat and condenses, the latent heat again appears as sensible heat. Thus, large buildings are heated by steam being passed through pipes, and, as it condenses, these pipes give out its latent heat. We are cooled by fanning because the warm air, thus brought in contact with the skin, causes a rapid evaporation of the moisture of the skin, thereby lowering the temperature. If water be placed in a vacuum space and the vapor which escapes from it be removed as rapidly as it forms, it is frozen by its own evaporation. Various machines used in manufacturing ice utilize this principle. The moisture taken up by the atmosphere in the form of vapor rises to considerable heights, forms clouds by partial condensation, and descends in rain when the point of saturation is reached.

EVARTS (ĕv′ărts), **William Maxwell,** lawyer and statesman, born in Boston, Mass., Feb. 6, 1818; died Feb. 28, 1901. He graduated at Yale, where he was joined by several others in founding the "Yale Literary Magazine." Later he studied in the Harvard Law School, and was admitted to the bar of New York in 1840. In 1860 he was chairman of the New York delegation in the republican national convention; served as attorney-general of the United States in 1868-69, and was counsel in the impeachment trial of President Johnson. He also was counsel for the United States before the tribunal of arbitration on the Alabama claims at Geneva, Switzerland, in 1872. In the famous trial of Henry Ward Beecher, which took place in 1874, he was senior counsel, and also served as counsel before the electoral commission in behalf of President Hayes. From 1877 to 1881 he served as secretary of state, was elected senator from New York for the term 1885-91, when David B. Hill succeeded him. Evarts ranks among the most eminent lawyers of America, was shown distinguished honors by several educational institutions, and published a number of addresses, among them the centennial oration at Philadelphia; a eulogy on Chief Justice Chase; and addresses delivered at the unveiling of the statues of Seward and Webster, and the Bartholdi statue of Liberty.

EVEREST, Mount, the highest mountain peak in the world, situated in Nepal, Asia, among the great peaks of the Himalayas. Its height is 29,002 feet above sea-level. The name was applied in honor of Sir John Everest (1790-1866), who was surveyor-general of India.

EVERETT (ĕv′ẹr-ẹt), **Edward,** statesman and author, born in Dorchester, Mass., April 11, 1794; died Jan. 15, 1865. When graduating from Harvard College, he was accorded the highest honors, though only seventeen years of age. While at this institution he was the principal editor of the "Harvard Lyceum," a college publication founded among the earliest in America. He became pastor of the Brattle Street Church in Boston when nineteen years of age, was appointed professor of Greek language and literature in Harvard, and later took a two years' course at the University of Gottingen, Germany, to prepare himself for the position. However, he resided four years in Europe and formed the acquaintance of many distinguished men, including Byron, Davy, Scott, and Jeffrey.

EDWARD EVERETT.

He began his work as professor at Harvard in 1819, where he gave a course of lectures on Greek art and literature that was afterwards repeated in Boston to large audiences. In 1820 he became editor of the "North American Review," and during his editorship he contributed about one hundred excellent articles. He was elected to congress in 1824, serving in the house for a period of ten years.

From 1835 to 1839 Everett served as governor of Massachusetts, and in 1841 was appointed minister to the court of St. James. While serving in that capacity he secured several important treaties, among them an agreement by which American seamen obtained the right to fish in the Bay of Fundy. While resident in London he was granted degrees and shown distinguished honors by the universities of Cambridge, Oxford, and Dublin. Soon after returning to America he was elected president of Harvard College, in which capacity he served in 1845-48. On the death of Daniel Webster he became secretary of state, and was chosen to the senate of the United States by the legislature of Massachusetts in 1853. The later years of his life most widely established his reputation and influence throughout America. His oratorical powers were revealed in several excellent orations in behalf of peace during the conflict preceding the Civil War, the most noted being one on Washington, which he delivered in many parts of the Union. Applications for lectures came from many quarters, and people everywhere showed an eagerness to hear him. His expenses were wholly borne by himself, though tickets were sold to all auditors, but the funds were contributed towards the purchase of the old home of Washington at Mt. Vernon, his contributions in this way amounting to $100,000. In 1860 he was nominated for vice-president on the ticket headed by Bell, though against his wishes. He delivered the address at the dedication of the national cemetery at Gettysburg in 1863. Among his principal works published are "Defense of Christianity;" "Orations from 1825 to 1836," and "Orations from 1825 to 1850."

EVERETT, a city of Massachusetts, in Middlesex county, in the extreme eastern part of the state. It is connected with Boston by railroads, is an educational center, and manufactures bicycles, chemicals, baby carriages, furniture, hardware, and gloves. The surrounding country is agricultural and contains oil deposits. A public library, several parks, waterworks, and electric street car lines are among the municipal facilities. Population, 1900, 24,336.

EVERETT, an important city of Washington, county seat of Snohomish county, on Puget Sound, about thirty-five miles north of Seattle. It is the converging center of several railroads, has a fine harbor, and is the seat of considerable interior and foreign trade. There are electric lights, pavements, good schools, and manufactures of lumber products, clothing, machinery, and utensils. Population, 1900, 7,838.

EVERGLADES (ĕv'ĕr-glādz), the name applied to a tract of swampy land in the southern part of Florida, 160 miles long and sixty wide. There are numerous marshy inlets covered with dense thickets, whose waters abound with alligators. The everglades were made historical by the Seminole Indian war, in which the chief, Osceola, bore a prominent part against Gen. Andrew Jackson.

EVERGREEN, the trees and shrubs which retain their verdure through all seasons, as the fir, laurel, cedar, holly, cypress, juniper, etc. Evergreens usually shed their leaves in the spring, after their successors have reached a state of development, but in some instances a set of leaves lasts several years. The leaves are generally of thicker and firmer texture than those of deciduous trees, and the undiminished thickness of the foliage, characteristic of the northern scenery both in summer and winter, affords exceptional winter shelter for animals. Evergreens form very popular ornamental shade trees, and their boughs are used on festive occasions for decorative purposes.

EVOLUTION (ĕv-ō-lū'shŭn), in biology and geology, the steps by which organic and inorganic matter came to exist in their present forms. It is evident to every inquiring mind that times come when both the infantile and philosophic are led to ponder the question of the origin of things. In attempting to answer man has constructed a cosmogony which seeks to give an account of the origin of the universe. There are three classes of cosmogonies that merit thought. These represent that the world has existed in its present form from eternity; that the matter, but not the form, of the world existed from eternity; and that the matter and form of the world are due to a spiritual cause. The last two are termed evolution and creation; the former seeks to trace the growth of the world and the expansion of life forms from cause to effect, while the latter disposes of the whole matter by attributing all laws of the universe, of life and being, to a divine godhead.

The very nature of the universe, with its varied changes through long periods of time, renders philosophies attempting to account for the laws that underlie cause and effect incapable of being grasped by even the highest effort of the intellect, and they are contradicted by various other philosophies and by the evidence of experience. The study of natural sciences has thrown light upon various questions relative to astronomical, geological, and biological phenomena. Through it have been fathomed many questions formerly incomprehensible, but there always remain conditions that point to a first cause which the most powerful intellect cannot comprehend. The theory of evolu-

tion involves a hypothesis that precludes a sudden and unexplained bursting forth of worlds and abrupt formations of physical laws to hold them in space, a miraculous springing up of life forms to inhabit and utilize nature's forces, but aims to account for all phenomena by natural laws, as the consequence of positive forces that operate under the will of a creator, or assume forms and undergo changes as the natural result of fitness. As a theory it superseded the crude anthropomorphisms that did not recognize the growth of the universe as the unfolding of a cosmic drama, as a development under laws that bear scientific scrutiny.

In former times it was held that the universe is permanent and at rest, having neither motion nor sensible change. The static views of ancient astronomers gave way to those of Kepler, Copernicus, Galileo, Herschel, and Newton, by which a conception of the kinetic forces was recognized and the nebular hypothesis established, which assumes to explain the commencement and motion of the planets and the sun by gradual condensation from a nebulous mist that occupied space. Geology led to a study of the earth's crust and to the belief that our sphere was once a globe of fire, which gradually contracted by cooling and caused the formation of an outer crust. The condensation of atmospheric waters caused the oceans, which finally became confined to definite regions and left large tracts of projecting lands, and after successive ages rivers and mountains were formed. That life existed during at least a large portion of the time required to form the earth's crust is demonstrated by fossil remains of animals and plants, which abound in many of the aqueous and metamorphic rocks. These rocks bear evidence that the lowest forms of life appeared first, and the higher gradually succeeded them and in many cases caused the disappearance of the earlier forms. The earlier animals were the protozoa, and after them, as if from evolution, came successively the radiates, articulates, mollusks, and finally the vertebrates. The earlier mollusks were followed by fishes, then came reptiles, later amphibious animals, and lastly mammals and man.

As a whole the fossil remains indicate that early life forms were general in character and gradually developed into the special; or, in other words, the evolution proceeded from the general to the particular, from the homogeneous to the heterogeneous. The changes were not abrupt, but proceeded gradually, one distinct form existing long periods of time after another had come into life. It is evident that the reptiles succeeded the fishes, though both existed afterwards contemporaneously, and the reptiles were succeeded in a similar manner by birds. In this way the different forms of animals passed into each other by slight changes, though these effected very various results after long periods of time. In the process of evolution, rudimentary or useless organs gave way, and later became either entirely lost or existed only as an evidence of the changes that had previously occurred. To illustrate, the fins of a fish were small organs, though afterwards they became modified as the wings of a bird, and later the paws of a dog, and still later the arms of a man. In the life forms still existing there are evidences of rudimentary organs, such as teeth rarely found in some birds, and hind legs concealed under the skin in some varieties of snakes. All that is true of animal life is also true of plant life, the lower forms existing at first gradually extending into other varieties and after successive changes multiplying into thousands of forms that exist at present. Besides, it must be borne in mind that there are fully as many extinct forms of plant as of animal life, the extinct species having been crowded out by others more nearly fitted to exist under the changed conditions of climate, and doubtless possessing greater ability to battle for place. There is also the evolution of mind from the uncultured and crude to the alert, scrutinizing, and moral. In society mind has undergone a long line of evolution, by means of which it has acquired useful arts and has developed a higher life and a more complete civilization.

Among recent writers on the theory of evolution are Huxley, Haeckel, Darwin, and Spencer. Huxley speaks of evolution as the system that "embraces in one stupendous analogy the growth of a solar system from molecular chaos, the shaping of the earth from the nebulous cubhood of its youth, through innumerable changes, and development of a living being from the shapeless mass of protoplasm we term a germ." Spencer attributes all the changes of nature to three agencies—force, matter, and motion—while Haeckel traces both the vegetable and animal kingdoms to one very low form of life, consisting of a cell, and supposes this cell to be produced by or from inorganic matter by spontaneous generation; this he asserts to be possible for the reason that some forms of animal and vegetable life are so nearly similar that it is difficult to classify them. Darwin in his "Origin of Species" intimates his belief that life may have been originally breathed by the Creator into a few forms or into one, and that the others sprang from them in successive stages. See **Darwinism**.

EWELL, Benjamin Stoddert, mathematician, born in Washington, D. C., June 10, 1810; died in James City, Virginia, June 19, 1894. He graduated from West Point at the age of twenty-two years, and served with distinction as professor of mathematics and philosophy. In 1836 he became professor of Hampden-Sydney College, and later held like positions in Washington College and William and Mary College, accepting the

presidency of the latter in 1854. After serving in the Confederate army, he was again elected president of William and Mary College, in which position he served until 1888. Later he obtained favorable recognition from Hobart College and the Royal Historical Society of England.

EWELL (yōō'ĕl), **Richard Stoddert,** Confederate soldier, born in Georgetown, D. C., Feb. 8, 1817; died Jan. 25, 1872. He graduated at West Point, served with distinction in the Mexican War, and later in the war against the Apaches in Mexico. At the beginning of the Civil War he resigned his commission as captain and entered the Confederate army, in which he attained to the rank of major-general. While serving under Jackson in 1862, he lost a leg, but after Jackson's death he took command of the second army corps and received the rank of lieutenant-general. His services to the Confederate cause were especially valuable at Winchester, Gettysburg, in the Wilderness, and at Spottsylvania Courthouse. Later he secured command of the department of Richmond, and, after being defeated, he was taken prisoner, and his whole command captured by Sheridan in 1865. His death occurred in Springfield, Tenn., where he settled after the war.

EWING (yōō'ing), **Thomas,** statesman, born in Ohio county, Virginia, Dec. 28, 1789; died in Lancaster, Ohio, Oct. 26, 1871. At an early age he was taken to Ohio, where he worked in the Kanawha salt works, and secured a fund sufficient to enable him to graduate from the Ohio University. Later he studied law, was admitted to the bar in 1816, and entered upon a successful practice in the courts of Ohio and the supreme court of the United States. He was elected to the United States senate in 1831, where he served six years, and later was made secretary of the treasury in the cabinet of President Tyler. President Taylor appointed him secretary of the interior in 1849, being the first to hold that office after the creation of that department, which position he held until the death of the president. Later he was elected to the United States senate, where he opposed Clay's compromise bill and the fugitive slave law, and advocated the abolition of slavery in the District of Columbia. His views on national banks were antagonistic to the policy of President Taylor, but in his postal policy he was vigorously supported and was instrumental in securing many improvements in the service. He retired from the senate in 1851, and resumed the practice of law in Lancaster, where he died twenty years later.

EXCHANGE, that division of economics which treats of the interchange of articles of value, as in commerce, or the transfer of commodities between different parties. The conditions peculiar to life confine the sphere of human activity largely to a particular place, while human wants are satisfied only by the productions from many different regions. From this localization of the efforts of man and the vast extent of his needs comes the necessity of transportation and trade. To be equitable the exchange must be mutual and voluntary between two or more parties, and the right of property must exist. These are primary conditions, since transfer without a consideration is a gift; involuntary relinquishment is robbery, and no exchange can be effected unless the parties interested possess a right to the property exchanged. The general law of exchange requires that value be given for value. In this connection the term value is used in a relative sense. It is defined as the estimate of the sacrifice requisite to come in possession of a desired object, and is sometimes spoken of as the cost of production. Hence, prices depend upon the supply and demand of a given article; or the quantity offered for sale on one hand, and the desire to possess on the other. It is understood that the desire must be more than mere longing, and must be attended by ability to purchase.

To promote exchange is one of the prime objects of government. In order to promote commerce and bring about the most beneficent results, legislation must aim to foster international and domestic trade; provide a wholesome monetary system; regulate banking; and guard against the evils likely to result from monopolistic control of certain avenues of trade and transportation, as well as the limitation of certain lines of production for the purpose of controlling prices. The term exchange is also applied to a class of transactions in commerce by which the debts of persons or corporations located in a distant city or country are canceled by a bill of exchange, as a check or draft, without the actual payment of money. This is effected by the payer depositing specie or its equivalent in a bank for the purpose of forming a basis whereby the checks or drafts issued can be redeemed. The greatest volume, both of domestic and foreign business, is transacted by this system of exchange.

EXECUTIVE (ĕgz-ĕk'ū-tĭv), the branch of a nation, state, municipal government, or corporation which controls the administrative functions. All free governments recognize three departments—the executive, legislative, and judicial—and no state can long exist without a distribution of its power and functions. The term is applied to the chief magistrate, whether governor, president, king, or emperor, and extends more or less to the principal officers in all civil institutions. In the United States the chief executive power is vested in the president, who is assisted by a cabinet having advisory functions. The president is by the terms of the constitution made ex-officio commander-in-chief of the army and navy of the United States, and of the militia of the several states when engaged in the actual service of the

nation. The principal officer of each department of the government may be required to furnish to the president an opinion in writing on questions relative to public interest. With the advice and consent of the senate the president is empowered to make treaties and nominate certain civil, military, and naval officers of the United States. Besides the duties especially enumerated in the constitution, it devolves upon the president to control the subordinate departments whose heads are known as secretaries of state, treasury, interior, war, navy, agriculture, postmaster-general, and attorney-general. The business of the government is carried on through these departments under the direction of the president; statutes are enforced, and special laws passed by congress are put in operation.

EXETER (ĕks'ę-tęr), an important city and river port of Devonshire, England, on the Exe River, about 170 miles from London. The site is on the summit and slopes of a beautiful ridge rising 150 feet from the bank of the river. It is surrounded by an agricultural country and carries on extensive manufactures. Though dating from the early history of England, it has been outgrown by many newer cities. Among the manufactures are agricultural implements, machinery, clothing, paper, gloves, and Honiton lace. The buildings of interest include St. Peter's Cathedral, St. Michael's Church, Albert Memorial Museum, and the remains of the castle of Rougemont. A canal connects the city with the tideway, and provides convenient access for vessels of three hundred tons. The city was founded before the invasion of the Romans, was captured by the Danes in 876, and possessed by them until entered by William of Orange in 1688. A new theater building burned Sept. 5, 1887, at which time 190 lives were lost. The building of railroads and its manufacturing capacity have given the city some advances, and within recent years it has shown evidences of growth. Population, 38,500.

EXETER COLLEGE, an educational institution located at Oxford, England, and formerly called Stapleton Hall. It was founded by Walter de Stapleton, and given its present name at the request of Edmund Stafford, bishop of Exeter, who added two fellowships.

EXETER HALL, an assembly hall with a seating capacity for 5,000 persons, situated on the Strand in London, England. It was completed in 1831, and in 1880 purchased at $100,000 for the Young Men's Christian Association. Formerly it was used for religious assemblies of various kinds and for musical concerts.

EXOGEN (ĕks'ō-jĕn), a plant whose stem increases in thickness by successive additions on the outside of what surrounds the central pith. The structure is best seen in the bodies of trees having a central pith, surrounded by as many concentric layers as the tree is old in years, and the whole enclosed by a cylindrical sheath of bark. Rays called medullary radiate from the central pith to the bark. Exogens have two seed-leaves, or cotyledons, and are called dicotyledons. The leaves, with a few exceptions, are reticulated, while the flower usually has four or five parts. In all these respects exogens differ from endogens. The greater part of the trees in hot climates and all of those in cold regions are exogens.

EXPANSION (ĕks-păn'shŭn), in physics, the increase in bulk which a body undergoes in consequence of a change in its temperature, so that it occupies a greater space while the weight remains the same. Heat is the most common cause of expansion. Water in cooling ceases to contract at 39.2° Fahr. and, in lowering its temperature, it expands again until frozen, when the expansion reaches about one-eleventh of its original bulk. Thus water, when at its greatest density, which is at 39.2° Fahr., presents the curious phenomenon of expanding whether heat or cold be applied. Expansion is common to all substances, though gases expand more than liquids, and liquids more than solids. It is due to this force that wagon tires are made somewhat smaller than the wheel. Hence, when heated, they may be slipped on easily, and in cooling contract sufficiently to hold the parts of the wheel securely together. Winds are caused by the air expanding under the heat of the sun, and the phenomenon of oceanic currents is due to the same cause.

EXPLOSIVES (ĕks-plō'sĭvs), substances that may cause an explosion by their sudden combustion or decomposition. The remarkable fact that explosives will not explode in vacuo was discovered early after gunpowder came into use, though the first definite experiments made in this connection were those of Priestly more than a century ago. These experiments were effected by placing gunpowder in vacuo and heating it by concentrating the sun's rays on it with a lens or burning-glass. Some writers have expressed the opinion that the discovery of explosives has been, next to that of printing and the application of steam power, the most valuable. It is true that their utility in the arts of peace is very important, as otherwise the vast engineering enterprises of modern times would have been entirely impossible or required a vast additional expenditure of time and labor. For convenience explosives are classed as explosive mixtures and explosive compounds. Explosive mixtures are those that can be separated more or less completely by mechanical means not involving chemical action. In a separate condition the ingredients as a rule do not possess explosive properties. Explosive compounds are chemical compounds or chemical combinations which possess a definite explosive molecule, and contain both the combustible and the supporter of combustion in a closely

united form. Most explosive mixtures require a particular period of time for combustion, while in explosive compounds the action is much more sudden and violent. Among the list of explosives may be classed gunpowder, nitrate mixtures other than gunpowder, chlorate mixtures, compounds containing nitro-glycerin, and gun-cotton. To these may be added the nitro-substitution compounds, including picric powders, springel explosives, and fulminates. There are numerous compounds that may be grouped with each of the above classes, all more or less valuable in war, for mining, and purposes requiring sudden development of a powerful force. Some of the newer explosives that have gone into use are smokeless, and others have been adapted to effect explosions unaccompanied by a loud report. However, explosions in these, as in all others, is due to the sudden formation and expansion of gases, owing to chemical agencies acting upon them. See **Gunpowder.**

EXPOSITION(ĕks-pō-zĭsh'ŭn), a national or international exhibition of the works of art and industry for the purpose of stimulating public interest, promoting manufactures, and expanding trade. The first great industrial exposition of the world was held at Paris in 1798, and its success led to a similar display of French industries in 1802. The effects of these expositions were so widespread and the results so beneficial that many other European and American nations were led to organize similar enterprises. Great expositions of more or less importance to the industrial arts were held prior to 1850 at Berlin, Vienna, St. Petersburg, Brussels, Moscow, Stockholm, Dublin, Lisbon, Madrid, Manchester, Philadelphia, New York, and other great centers of population. Among the noteworthy international expositions held since are several that attracted the attention of practically every civilized nation. The first of an international character held in Britain occurred at Crystal Palace, London, in 1851. Soon after, in 1853, the United States made its first general effort in this direction at New York. The first universal French exposition was opened in Paris in the Champs Elysées in 1855, and contained exhibits of about 24,000 different persons and interests. A great international exposition was given in Haarlem, Holland, in 1861. The Belgians opened a similar enterprise at Brussels in the same year, and Britain followed with an international exhibition in 1862.

The second international exposition of France opened on the Champ de Mars in 1867. It was followed by the exposition at Philadelphia, Penn., in 1876, to commemorate the centennial of the Declaration of Independence. The main building of the Centennial Exposition alone had a floor space of twenty acres, being 460 feet wide and 1,180 long, while the other buildings were proportionally grand and extensive. France gave a third international exposition at Paris in 1878, the area occupied by it amounting to 140 acres; and in 1889 gave the fourth to commemorate the centenary of the French Revolution. One of the prominent features of this exposition was the famous Eiffel Tower (q. v.). The next great exposition given in the United States was held at Chicago in 1893, being designed to commemorate the 400th anniversary of the discovery of America, and constituted the most successful and popular ever held in the western hemisphere. Both before and since the Chicago exposition numerous national or district expositions have been given, such as the Cotton States Exposition at Atlanta, the Trans-Mississippi at Omaha, and the Pan-American at Buffalo. The most successful and greatest of European expositions was held in Paris in 1900. It attracted a large number of visitors and the most valuable exhibits ever made in the arts and sciences.

The leading expositions of the last thirty years, with the total paid and free attendance and the total receipts, including admissions and concessions, are as follows:

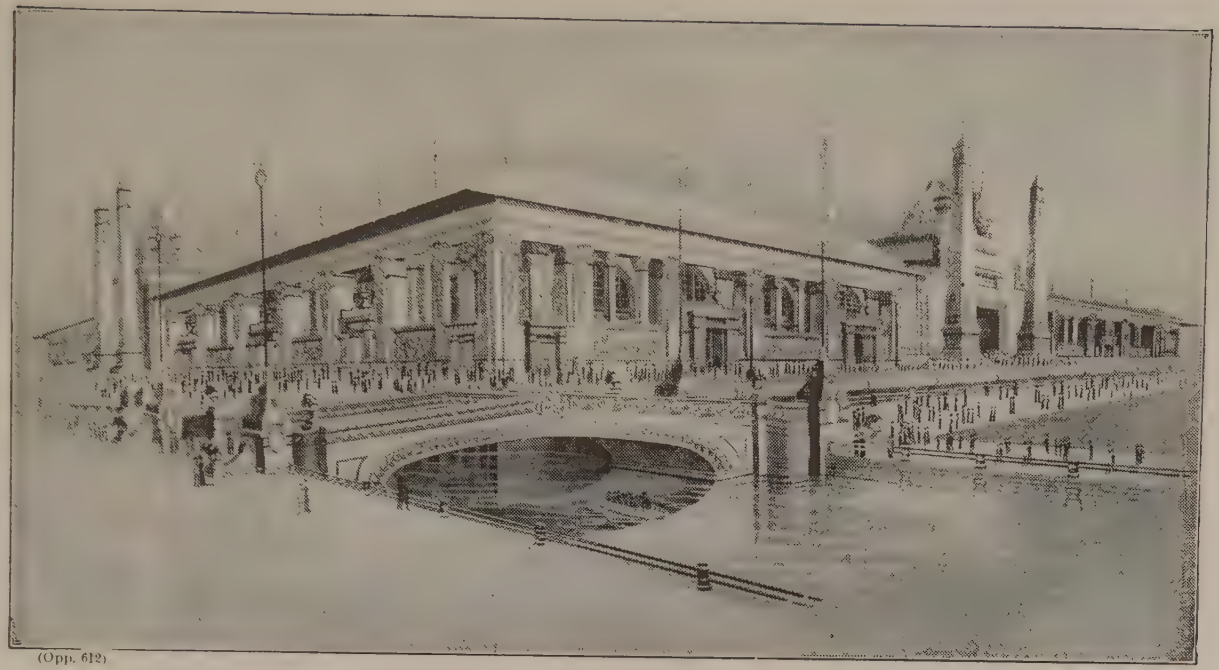
Expositions.	Attendance.	Receipts.
Vienna, 1872.....	7,254,687	$ 6,971,832
Philadelphia, 1876..	9,910,996	3,813,724
Paris, 1878.....	16,032,725	2,531,650
Paris, 1889.....	28,149,353	8,300,000
Chicago, 1893.....	27,539,521	14,117,332
Paris, 1900.....	50,120,540	24,788,360

See **World's Columbian Exposition.**

EX POST FACTO, a law that is retroactive, and which makes an act criminal that was not criminal when committed; or increases the severity of the punishment attached to the crime when it was committed. The United States and the several states are forbidden by the constitution to pass such a law.

EXPRESS (ĕks-prĕs'), a system of rapid conveyance and safe delivery of merchandise and parcels. The express business of the United States is the outgrowth of the custom under which stage-coach drivers, railroad conductors, and others were intrusted with parcels for delivery, and was formally organized by William F. Harnden (1813-45), of Boston, in 1839. He contracted with the Boston & Worcester Railroad Company for the transmission of packages. The project commended itself to business men, and soon after express lines were organized and connections established in all directions. In 1849 the Adams & Company's California Express was established; in 1852, the Wells, Fargo & Company's, and in 1855, the American-European Company's. The express business is carried on by these and similar companies under contract with the railroad companies, the latter furnishing carriage along their lines, while the express companies attend to the receipt and safe delivery of parcels.

At present the capital stock of the express



(Opp. 612)

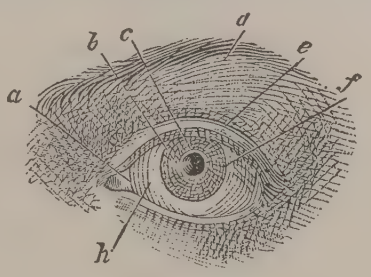
MINES AND METALLURGY BUILDING AT THE LOUISIANA PURCHASE EXPOSITION, ST. LOUIS, MO., IN 1904.

companies amounts to millions of dollars, the leading organizations being the Adams Express Company, United States Express Company, American Express Company, and Wells, Fargo & Company. The business comprises, besides delivering parcels of merchandise, the issuance of checks, collection of accounts, and in some cases the care of deposits. A system of C. O. D. business, meaning collect on delivery, comprises the plan of transporting goods to consumers or dealers and collecting the purchase price when delivered. In most European countries the carrying service is performed by the postoffice system under the direction of the government, though in Britain the railroad companies themselves handle this branch of business on all lines where the parcel post has not been established. The law includes express companies with the list of common carriers, by which they are held liable for losses the same as such carriers, even though their bills of lading declare otherwise. Express money-orders are receivable at banks, and payable in nearly all civilized countries of the world on an equal basis with drafts issued by banks or government postal money-orders.

EXTENSION (ĕks-tĕn′shŭn), in physics, that property by virtue of which matter occupies space and possesses volume. An atom is exceedingly small, yet it has definite size; that is, it has extension, or occupies space in three dimensions—length, breadth, and thickness. Extension is necessarily possessed by molecules and masses, and is, therefore, a general property of matter.

EYCK (īk), **Hubert** and **Jan Van**, two Flemish painters of the 15th century. The date and place of their birth are uncertain, though it is thought they were born at Maas Eyck, and that they resided chiefly at Bruges and Ghent. The date of Hubert's birth is about 1366; his death occurred in Ghent, Sept. 18, 1426. Jan was born about 1389, and died in Bruges, July 9, 1440. These two painters are distinguished largely because they are the reputed inventors of oil painting, and the founders of a Flemish school. The exquisite finish and beautiful coloring of their work have never been excelled. Many of the masterpieces executed by the two brothers are extant, the best being found in Bruges, Berlin, Antwerp, Ghent, Paris, and Munich. Three pictures painted by Jan in the years 1432, 1433, and 1434 are in the national gallery in London. The exquisitely finished production, "Chancellor Rollin Kneeling Before the Virgin," is in the Louvre, in Paris.

EYE, the organ of sight, consisting of a globe about an inch in diameter, situated in a bony cavity of the skull, and protected by the overhanging brow. It is formed of a tough membrane called the sclerotic coat, which gives form to the eye; the transparent, convex part in front forming the cornea. A thin, black membrane, termed the choroid coat, lines the sclerotic coat, which contains the blood vessels, while its black color serves to prevent reflection of the rays of light. A very thin and transparent membrane, called the retina, is inside the choroid coat and is



THE HUMAN EYE.
a, semilunar fold; *b*, iris; *c*, pupil; *d*, eye-brow; *e*, eyelid; *f*, cornea; *h*, sclerotic coat.

an expansion of the optic nerve. The anterior and posterior chambers are filled with a liquid, that in the former being a thin, clear liquid called the aqueous humor, and that in the latter a thick, jelly-like fluid termed the vitreous humor. These humors serve to keep the eye distended and in shape. Between the two chambers is the crystalline lens, which operates to bring the rays of light to a focus on the retina, and is kept in place by the ciliary process. A curtain, called the iris, is hung behind the cornea, whose center is a hole called the pupil. The several colors observed in the eyes of different persons are merely the iris, which varies from blue to a dark brown, and is seen through the pupil. The colorless effect seen in the eyes of the albino is due to the absence of color cells; the pink tint often seen in them is caused by the blood affecting the appearance of the iris on account of the absence of other coloring matter.

The eye is protected by close-fitting shutters called eyelids, and by a padding of fat situated between the eyeball and the walls of the orbit in which it is situated. A mucous membrane lines the inner side of the eyelids, and, by being exceedingly sensitive, aids in protecting the eye from irritating substances. The edges of the lids are lubricated by oil glands situated within the eyelashes, which prevent them from adhering to each other. Besides, the lashes guard against dust, while, with the lids, they serve to shield against a blinding light. The mucous membrane and cornea are moistened by a saltish fluid called tears, which is secreted by the lachrymal glands, two oblong bodies situated just above and to the outside of the eyeballs. Several ducts facilitate a flow of tears upon the inner surface at the outer edge of the upper eyelid, thus washing the eye and keeping it clean from dust, the tears passing into a little basin at the inner part of the eye near the nose, called the lachrymal lake, from which they are drained into the nose by the nasal duct. The

lachrymal lake overflows upon the face in disease, old age, and when crying.

The phenomenon of sight is one of intense interest to the student of natural history. It is dependent upon a substance called ether, which is infinitely more subtile than air and is thought to be a thin gas filling all space. Waves of light are produced in the ether as sound waves are caused in the atmosphere. The motion waves of ether are produced by a light, for example a lamp-light, pass through the pupil of the eye to the retina, and are carried by the rods and cones through the optic nerve to the brain, where the light is seen. The variously shaped rods and cones serving to carry the light are to the eye what bristles, otoliths, and Cortian fibers are to the ear. The optic nerve, which has its root in the brain and enters the eyeball, is itself insensible to light. There are no rods and cones at the point where it enters the eye, and this is called the blind spot. The rays of light are bent by the convex lens so they meet at a point called the focus; a good example of this can be given by the use of a common burning-glass, through which the focus point is heated to burning by bending the rays of the sun. When entering the eye, the rays of light are converged in a similar manner by being brought to a focus on the retina, and influenced somewhat in a like manner by the cornea on the humors of the eye. Distant objects tend to diverge rays of light less than those near by, and under such conditions the crystalline lens does not need to bend so much as in seeing objects near at hand. This property of adjusting the lens of the eye to far or near vision is called accommodation. The ordinary adjustment of the eye muscles when at perfect rest is of such a character that objects at all distances over twenty feet can be seen clearly. Objects at a smaller distance than twenty feet away from the eye require that the muscles adjust the lens to a more curved position. In this way it is possible for the eye to see clearly at a distance of about five inches, while vision is best at about ten inches from the eye.

There is only a small part of the field of view in which a person can clearly recognize objects, being just in front of the eyes, while only indistinct shadows seem to occupy the rest. In reading not more than two or three words can be seen distinctly, but by rapid and unconscious movements of the eyes sidewise the field of view is greatly enlarged. When the eyes are directed towards an object, the sensation of sight is produced almost instantly, but the image persists about one-tenth of a second. It is due to this property that a lighted stick waved rapidly by the hands appears as a circle of fire. Exhibitors have taken advantage of it by throwing a succession of pictures of a moving object upon a screen at a particular rate, and thus convey to the auditors the effects of movement without interruption. If two shining lights are waved, they appear as one, and two colors revolved quickly give the effect of a mixture of two. Thus, a yellow and a blue surface placed side by side and revolved quickly before the eyes appear as a single green spot.

Color-blindness is due to an impairment of the nerves of the retina, leading to an inability to recognize certain colors. Since locomotive engineers and sailors are guided by differently-colored signals, this defect is a serious one. The retina becomes exhausted when the eye looks steadily at an object for a long time. It is fatigued by bright-colored objects much more readily than others, and during a state of exhaustion is often confused in the recognition of colors, being made color-blind. The intensity of light has an effect upon the pupil, bright light causing a contraction. This results from a strong light exciting the reflex centers of the optic tubercles and has the effect of contracting the muscles of the iris. In the dark, on the other hand, the pupil is enlarged so as to admit all the light possible. In this way, and by means of the muscles that control the upper and lower lids and the eyebrows, it is possible for the eyes to protect themselves against a light too strong to be admitted, though the contracted muscles become easily tired and pain results. Far and near sightedness are caused by defects in the crystalline lens. If the lens is too convex, the rays are brought to a focus before they reach the retina; if too flat, the retina is reached before coming to a focus. In each case the sight is more or less indistinct. Another common defect is a flattened or elongated shape of the globe of the eye. Far-sightedness results when the globe is flattened, and near-sightedness when elongated. The former is overcome by convex lenses and the latter by concave.

The care of the eyes is an important matter, since the loss of vision is a source of much sorrow. Glasses should be worn when they serve to improve the sight, since straining impaired power results in even greater weakness. Fine print and reading by a dim light are harmful, while the sight is often impaired by reading on cars, for the reason that the lens becomes wearied by striving to adapt itself to continuous variations of distance. Light should never be in front when reading or working, but should come over the left shoulder. Alcohol and tobacco tend to cause dimness of vision by weakening the optic nerve. Röentgen discovered a kind of light produced by electricity, in 1895, which penetrates flesh, wood, and other substances. By means of this light it is possible to determine by sight the forms of different organs of the body, to examine the bones in the living body, and to locate many substances foreign to the system. Several valuable discoveries relative to the eye have been made by means of it.

The eyes of fishes, reptiles, birds, and quadrupeds are essentially the same as in man. In insects the eyes are immovable and have a dome shape. Thousands of smaller eyes like honeycomb make up each of the two eyes. At the bottom of the cavity is a nerve to which each little eye may conduct light by means of a lens. As the scale of animal life descends, there is a marked decrease in the power of vision. For instance, in the leech the nerves of sight end in a spot of dark coloring matter of the skin by means of which it is able to receive some idea of its surroundings. Still lower in the scale we find life forms that are barely able to recognize the difference between light and darkness, while those that live wholly in the dark lose the use of this organ, as, for instance, the fish found in the Mammoth Cave of Kentucky.

EYLAU (ī'lou), a town in Germany, twenty-two miles south of Konigsberg, and the scene of an indecisive battle on Feb. 8, 1807, between Napoleon and the allied forces of the Prussians and Russians under Count Levin Bennigsen (1745-1826). The army under Napoleon consisted of about 80,000 men, while the allied forces were smaller, but the latter possessed more artillery. A brisk struggle continued during the day, and as night approached the troops of Napoleon were driven before the allies. In the night the French army retreated. The loss on each side is estimated at about 18,000 men. The town has a population of 3,600 and is connected by railway with Konigsberg.

EYRE (âr), one of the largest lakes in Australia, in the province of South Australia, at an altitude of eighty feet. It has an area of 3,708 square miles. Its name is from Edward John Eyre, who discovered it in 1840. The water is highly salty and in dry seasons evaporates largely, leaving a great salt marsh. The waters of the Macumba, Cooper, and Warburton rivers flow into it, but it has no outlet to the sea. There is a railroad line from Lake Eyre to Spencer Gulf.

EZEKIEL (e-zē'ki-el), meaning strength of God, one of the Hebrew prophets, to whom is attributed one of the books of the Old Testament. He was the son of Buzi, a priest and was carried captive to Mesopotamia along with Jehoiachin, king of Judah, about eleven years before the destruction of Jerusalem under Zedekiah. There with other Jews he settled on the banks of the Chebar River and began his work as a prophet in 594 B. C. His prophecies are mostly in chronological order, and consist of three parts—those relating to the complete overthrow of the Jewish nation on account of increasing unfaithfulness to God; those threatening the surrounding nations with divine punishment, and the prophecies of the future deliverance of the Hebrew nation and the rebuilding of Jerusalem. Ezekiel's death is not recorded, but it is thought his prophetic career extended over a period of twenty-two years.

EZRA (ĕz'rà), a celebrated Jewish priest, a descendant of Aaron, whose patriotic and priestly services to the Jews are detailed in the book bearing his name. He was a ready scribe in the law of Moses, to which he was passionately attached. An exile in Persia, he so commended himself to the reigning monarch, Artaxerxes, as to obtain from him permission to lead the second expedition of the Jews back to their own land. This enterprise began about 458 B. C. Subsequently he resided in Babylonia, and still later at Jerusalem, where he endeavored to reimpose more strictly the laws of Moses, forbidding marriages with heathen women and annulling such ties where they had been formed. He introduced into the Jewish literature the square Chaldee characters, in place of the old Hebrew forms that had been customary till then. The place of his death is uncertain. The book of Ezra spans a period of eighty years, from Cyrus in 536 B. C. to Artaxerxes in 456 B. C. Some biblical scholars believe it to be from the pen of Ezra, while others admit a plurality of authors. Both Jews and Christians consider the work part of the Scripture canon.

LANDING OF COLUMBUS.

F

F, the sixth letter and fourth consonant of the Latin and English alphabets. It is formed by the passage of breath between the upper front teeth and lower lip, is classed with V as a labio-dental, and belongs to the class of consonants called aspirates. The figure of F corresponds to the digamma of the Greek, and also resembles it closely in power. F, in music, is the fourth note of the natural diatonic scale of C. F major, as a key, has one flat at its signature, namely, B flat. The tone F is called "fa" in Italy, France, and some other countries.

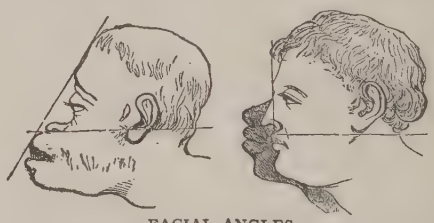
FABIUS MAXIMUS (fā'bĭ-ŭs măx'ĭ-mŭs), a distinguished member of an illustrious patrician family of Rome. The Fabii family established themselves in Roman history by undertaking to defend its territory against the Veientes incursions, but they were killed in 477 B. C. Fabius Maximus was the most distinguished of the second Fabii family. He served five times as consul and twice as censor, and, after the Roman defeat at Trasimenus, was elected dictator. In the second Punic War he attained eminent success against Hannibal by the Fabian policy of war. This policy consisted of avoiding a direct engagement, harassing the enemy by surprises, annoying them by marches and flank movements, and destroying their foragers and stragglers. While he pursued this policy, Rome assembled her forces and prepared them for greater efficiency in common defense against the enemy. In the fifth consulship Fabius recovered Tarentum, an important position that had long been possessed by Hannibal. His death occurred in 203 B. C.

FABLE (fā'b'l), a feigned story or tale intended to enforce some moral precept, told in prose or poetry, in which inanimate things and animals are represented with human interest and passions. By the novelty and utter impossibility of the representation, the interest of the hearer or reader is excited, and thus its symbolic meaning and moral become apparent to him, at least if the fable is well contrived. The ancient fabulists were simple, clear, and earnest, and seem to have sprung up in the East. Among the more celebrated are Bidpai, or Pilpay, and the Arabian Lokman, who lived at the time of King David. Among the Greeks the greatest fabulist is Æsop. Phædrus, the most celebrated Roman fabulist, cleverly imitated Æsop, but with considerable modification, thus giving force to his writings. In later times Gay among the English, Lessing and Gellert among the Germans, and Krylov among the Russians are celebrated. La Fontaine, a French writer of fable, for delicate sarcasm, sagacity, and felicity of expression takes high rank.

FABRICIUS (fă-brit'se-ŏŏs), **Caius**, an ancient Roman who was noted for his characteristic virtue in moderation, fearless integrity, and contempt of riches. He was elected consul in 283 B. C., defeated the Boii and the Etruscans the same year, and was sent on a mission to treat with Pyrrhus the following year. Notwithstanding the fact that he held numerous lucrative offices, he died poor, and the state provided funds for the support of his daughter. In recognition of his military achievements and incorruptible integrity, a decree was made by the senate which provided a burial place within the city for him and his descendants.

FABRICIUS, Johann Christian, entomologist, born in Tondern, Germany, Jan. 7, 1743; died in Kiel, March 3, 1808. He was educated at Copenhagen, Leyden, and Freiberg, and obtained a professorship in the University of Kiel. Besides his excellent services in teaching natural history, he wrote a number of treatises on entomology and outlined a policy of economy for Denmark. Among his publications are "System of Entomology;" "Philosophical Botany," and "Philosophical Entomology."

FACIAL ANGLE (fā'shal ăn'g'l), an angle formed by two imaginary lines—one drawn from the most prominent part of the



FACIAL ANGLES.

forehead to a point opposite the incisor teeth; the other from the external ear to the same point, the object being to measure the elevation of the forehead. This angle was made the basis for classifying the races by the Dutch anatomist, Pieter Camper, and is sometimes called Camper's Angle. While it has served a useful purpose in ethnology, it is not an infallible criterion of the intellectual capacity of an individual. The general facial angle of anthropoid apes is 40°, of the African Negro 70°, and of the Europeans 80°. Since angles almost as varied can be found in a single large community, the Camper method has been superseded by those of Blumenbach, Cuvier, etc.

FACTORY (făk'tō-rў), the name derived

from factor, and used largely in Britain to designate an established agency to do business in buying or selling for others. Within recent years the name has come to be applied to an establishment devoted to the manufacture of various articles of commerce, and includes the machinery and buildings necessary to such manufacture. The building of great factories is comparatively recent, and resulted from the invention of useful machinery, the extensive subdivision of labor, and the construction of vast avenues of commerce that facilitate the transportation of manufactured commodities to distant consumers. Doubtless material advantages have sprung up from the factory system, such as increased productiveness resulting from the division of labor; greater mechanical accuracy and a lessening of the cost of production, two results of bringing together different laborers with varied capacity; and the wholesome effects that follow co-operation and co-partnership among the masses of the workingmen. Trades unions and the various forms of organization that have sprung into existence are the direct result of the concentration of laborers in manufacturing centers. It is probable that the good resulting from the factory system is counterbalanced largely by a curtailment of independent intelligence, which follows the minutely subdivided operations resulting from the piece-work of each individual workman. Other disadvantages urged against the factory system are the evil influences upon the health of the workmen, brought about by being crowded into small rooms; the contract system, by which large colonies of foreign laborers are imported, and the interference to wages resulting from the employment of many children and women.

The factory system as existing in the United States has called for regulation by state laws of the manner of managing workshops, mines, and factories. Legislation along this line has been intended to improve the sanitary conditions of all places where large numbers of workmen are employed by making them subject to public inspection, and establishing rigid rules under which vast enterprises may be managed efficiently. Among the primary objects of legislation are the protection of life and health of the workmen; the prevention of spreading infectious diseases and vermin by reason of the manufactured product, and the protection of the laborers and operators against strikes, disorders, and general disorganization of institutions. Legislation has been directed more commonly with respect to the number of hours the workmen may labor daily. There have also been enactments to limit the labor of women and minors, and the manner of and time for which laborers shall receive compensation.

Statutory provisions in some states forbid the employment of minors under certain ages, while in others it is necessary for children to be able to read and write, or have attended school for a certain period before being admitted to the factory. These safeguards are intended to prevent the corruption of morals among children, and vouchsafe to them conditions under which they may secure a suitable education. The supreme courts in a number of states, among them Ohio, Pennsylvania, Missouri, West Virginia, and Illinois, have held laws that require the payment of laborers in money to be unconstitutional, though others have held them sound and operative. Among the many questions of interest to our nation the one relating to the rights and privileges of both the employer and employee take high rank, though legislation that may tend to secure the best business conditions, and operate to the highest interest of both capital and labor employed in the factory system is yet awaiting solution by statesmen and legislators.

FACULTY (făk′ŭl-tȳ), the term employed to designate collectively the teachers and professors of an institute, college, or university, or the instructors in any department of such an institution, as the faculty of law, of theology, of arts, or of medicine. It is also applied collectively to the members of the learned professions, as the faculty of advocates, the medical faculty.

FACULTY, in mental science, a natural power of the mind by which it acts uniformly and with facility in some specific way. Hewett defines faculty as a power under the control of the will, having a specific work to do, and as examples enumerates memory, seeing, love, and judgment. Crabb holds that faculty is a power derived from nature, and differs from ability in that the latter is derived either from circumstances or otherwise.

FAED (fād), **Thomas**, celebrated painter, born in Burley Mills, Scotland, June 8, 1826; died Aug. 17, 1900. He became an associate of the Royal Scottish Academy in 1849, a member of the Royal Academy in 1861, and an honorary member of the Vienna Royal Academy in 1875. Among his earliest drawings in water colors is one entitled "Old English Baron." The most celebrated of his newer works are "Mitherless Bairn;" "First Break in the Family;" "From Dawn to Sunset;" "Reading the Bible;" "Last of the Clan," and "Scott and His Friend at Abbotsford."

FAHRENHEIT (fä′rȩn-hīt), **Gabriel Daniel**, celebrated physicist, born in Dantzic, Germany, May 14, 1686; died Sept. 16, 1736. He studied for commercial business, but soon abandoned his early desires and entered upon the study of natural philosophy. Soon after he traveled extensively and later settled in Holland, where he took a course under Gravesande in science and formed the friendship of many noted men. In 1714 he discovered

that quicksilver possesses greater utility for use in the construction of thermometers than spirits of wine, which had been employed previously. In devising a thermometric scale he took as the zero point the lowest temperature observed by him in the winter of 1709 at Dantzic, which he found was produced by an equal quantity of snow and salt. The space between this point and that to which the mercury rose at the freezing point of water is divided into 32°, and from zero to the boiling point of water into 212°. Later he contrived a machine for draining swamp lands. In 1724 the Royal Society of London elected him a fellow. The Fahrenheit thermometer is generally used in the United States for all practical purposes. See **Thermometer.**

FAIENCE (fà-ē-äns'), a term applied generally to all classes of porcelain and glazed earthenware. The name was derived from the town of Faenza, Italy, where majolica, a fine grade of pottery, was manufactured in the 14th century. The faience manufactured at present was invented in the 16th century as an imitation of majolica and obtained its name in France. However, the faience of the market is made of a ruddy earth, covered with an enamel, and is quite often richly painted.

FAINTING (fānt'ĭng), a sudden loss of consciousness, with pallor and feeble respiration and heart action. The morbid condition generally continues from a few seconds to a minute, but in some cases lasts for hours and even days. It is produced by loss or sight of blood, pain, or impure air generated in overcrowded public buildings. It rarely ends in death and more commonly affects women than men. Recovery is most rapid in a recumbent position. Fresh, cool air, cold water sprinkled on the face, and the loosening of any tight articles of dress tend to a speedy close of the syncope.

FAIR, a stated or regular market where buyers and sellers gather to transact either a particular or general class of business. Fairs of this character originated on account of the convenience resulting from the buyers and sellers of agricultural products common to a region coming together. The fairs held in the Middle Ages were chartered by public officials, who announced them by proclamation. This class never obtained a wide foothold in America, though there are fairs at which an exhibit of agricultural products, manufactures, and other articles of value are exhibited for public inspection and study. The term is applied also to bazaars where fancy articles are offered for sale, and quite frequently to state and national expositions. In Europe it is quite common to hold fairs at which buyers and sellers are brought together. Among the great periodical fairs are those held at Novgorod, Russia; Lyons, France; Leipsic and Frankfort-on-Main, Germany, and the Donnybrook Fair, Glasgow Fair, and Greenwich Fair in Britain.

FAIRBAIRN (fâr-bârn), **Sir William,** railroad magnate, born in Glasgow, Scotland, March 7, 1828. He descended from a prominent family, was educated at Cambridge University and called to the bar. In 1856 he formed a partnership with his father; served as mayor of Leeds in 1866-68; was knighted soon after, and became interested in the Great Northern railway. He served as commissioner at the Paris exposition in 1878, and was a member of the house of commons for twelve years, beginning in 1880. Fairbairn was prominently connected with several international railway congresses of Europe. The king of Belgium knighted him, and in 1892-93 he served as high sheriff of Yorkshire.

FAIRBAIRN, Sir William, civil engineer, born in Kelso, Scotland, Feb. 19, 1789; died April 18, 1874. After securing a rudimentary education, he was apprenticed as an engine-wright in North Shields, and soon after commenced business at Manchester, where he made several important inventions that led to the use of iron shafting in cotton mills. His attention became attracted to the use of iron as a material in bridge and ship building about 1831, which led to many useful inventions and valuable patents, and was the immediate cause that led to the construction of several thousand bridges. Later he became extensively interested in iron shipbuilding at Manchester and Millwall, near London, and produced many useful and serviceable vessels. He was made a baronet in 1869, and later a chevalier of the Legion of Honor. In connection with Robert Stephenson he constructed a tubular bridge across the Menai Strait. Among numerous works and papers published by him are "Our Canal Steam Navigation;" "Iron and Great Britain;" "Treatises on Mills and Mill Works," and "Strength of Iron at Different Temperatures."

FAIRBANKS, Erastus, manufacturer, born in Brimfield, Mass., Oct. 28, 1792; died Nov. 24, 1864. He entered upon the study of law, but soon began the manufacture of cast-iron plows and castings. In 1824 he located a plow factory at St. Johnsbury, Vermont, but later gave his entire attention to the manufacture of platform scales invented by his brother, Thaddeus, who was jointly interested in the enterprise. Erastus was a member of the state legislature in 1836-38, became president of the Passumpsic Railroad Company in 1849, and was elected governor of Vermont in 1851 and again in 1860. The scales manufactured by the firm, though modified by improvements, are in general use throughout the United States. His brother, Thaddeus, was born Jan. 17, 1796; died April 12, 1866. He worked in a saw and grist mill with his father and patented the well known Fairbanks platform scales in 1831. The patents held by him covered about fifty useful inventions. He was granted the cross of the Order of

Francis Joseph by the emperor of Austria in 1873.

FAIRCHILD, James Harris, theologian, born in Stockbridge, Mass., Nov. 25, 1817. In 1838 he graduated at Oberlin College, where he became professor of languages in 1842. Later he was professor of mathematics, and in 1858 was chosen to the chair of theology and moral philosophy. He was elected president of the institution in 1866. In 1870-71 he traveled in Eurasia and Africa, and subsequently in the Hawaiian Islands. Among his works are "Elements of Theology" and "Moral Philosophy." He also edited Finney's "Systematic Theology." He died at Stockbridge, March 19, 1902.

FAIRFAX (fâr'faks), **Thomas, Lord,** distinguished general, born in Denton, England, Jan. 17, 1612; died near York, Nov. 12, 1671. He studied at Cambridge, and soon after entered the military service in Holland. In 1644 he distinguished himself in the battle of Marston Moor, and the following year received a command in the parliamentary forces. He refused to march against the Scots in 1650, and the command was given to Cromwell. After retiring to private life in 1660, he received an appointment as commissioner to The Hague to negotiate the return of Charles II. to England. He published several works in prose and poetry, the one entitled "Short Memorial" being the best known.

FAIRIES (fâr'ĭz), the name applied to imaginary beings, ordinarily small and of graceful human form, but capable of assuming any shape and working good or evil to mankind. Belief in them has been among the superstitions of many peoples. Some other names for them are elves, brownies, goblins, dwarfs, pixies, kelpies, and gnomes. It is difficult to give any scientific definition of the nature of fairy superstitions, because they followed no regular law, human or divine, but obeyed the impulse of their own caprice. Hence, every fairy tale differs from others in some respects. In the parts of the world where there are mountains, mists, cataracts, and stormy oceans all superstitions are naturally exaggerated, while in flat and well cultivated countries the fairies are simple and homely, and connect themselves with matters of domestic routine, such as sweeping the floor, skimming milk, preserving butter, and other household duties. In Scandinavian countries the fairy people are connected with storms and convulsions. They are represented in the act of betraying people into dangerous places, flying away with them into cloud-land, or as leading them through endless caverns within the earth. They have been spoken of in Ireland as a wandering remnant of fallen angels.

The tales of some nations divide fairies into three classes—those that dwell in the upper air, those within the interior of the earth, and a third class that frequent the waters; the latter are known as mermaids and sirens. Fairy stories were introduced into France and Germany as early as the 12th century. They became generally popular in the latter part of the 17th century, the Italians taking the most extended interest in them. Literature in all countries abounds more or less with fairy tales. Among the best collections of later times are those of the Grimm brothers in German; Knightley's and Craker's in English, and Hans Andersen's in Danish. Many fairy tales and legends have been translated into modern languages and become the common property of all. The translations have been devised suitably for home and school reading. Many of the eminent teachers, among them Herbart, Fröebel, and Pestalozzi, have recommended them as of special value in child culture during the formative period. Their use for that purpose in American and European schools is very extensive.

It is quite probable that fairy tales and legends are the outgrowth of mythology and folklore. Primitive people being unable to express ideas in the abstract, their customary forms gave rise to the use of familiar and concrete terms. The mystery of storms, zephyrs, caves, ocean waves, mountain echoes, passage of clouds, and the strangeness of life and death all had more or less influence to impress them with awe, and to inspire and amaze. The early history passed from generation to generation, not in written story, but as a living tale, and later became perverted in mythology, folklore, and fairy tales. To their own legends were added those of near or distant peoples, by which the tales they told grew into vast numbers and took on diversified and complicated forms. The giant stories of the Orient, one-eyed Cyclops tales of Asia Minor, and the mysteries of the Greek and Roman gods were capable of almost indefinite expansion and contraction, especially when brought in contact with the northern heroes and the tales of the Niebelungenlied. In pondering the early peoples it is not difficult to comprehend how the folklore, mythology, and hero worship became prolific sources for the growth of numerous and diversified tales, and, associated with the romance of the ages, gave rise to a vast number of stories that have come down to us. Many of the fairy tales remain highly interesting and fruitful objects of study.

FAIRMOUNT, a city in West Virginia, county seat of Marion county, on the Monongahela River, seventy-five miles southeast of Wheeling. It is well connected by railways, and surrounded by a farming and coal-producing country. There are manufactures of flour, cigars, machinery, and furniture. The city has good schools and a number of excellent public buildings. Population, 1900, 5,655.

FAIR OAKS, a railroad station in Virginia, near Chickahominy, Henrico county. It was the scene of a battle between the

Confederates under General Johnston, numbering 35,000 men, and a detachment of General McClellan's army under General Silas Casey (1807-82), including about 11,000 troops. The engagement at Fair Oaks, or Seven Pines, as it is sometimes called, was the first important encounter between the army of the Potomac and the army of northern Virginia. It occurred on May 31 and June 1, 1862, though on the former date the activities were largely at Fair Oaks, and those of the latter date at Seven Pines. The result of the battle of the first day was indecisive, but on the latter the Confederates were routed with much slaughter. The loss on the Union side was 5,031, and on the Confederate side 6,134. General Lee succeeded General Johnston while the battle was in progress, and General McClellan likewise succeeded General Casey.

FAITHFULL (fāth'ful), **Emily**, authoress, born in Headley Rectory, Surrey, England, in 1835; died June 3, 1895. She was the daughter of Rev. Ferdinand Faithfull, and received an education at a school in Kensington. In 1860 she established a typographical business in London for women compositors, with the approval of Queen Victoria, which was called the Victoria Press. She founded the "Victoria Magazine" in 1863, in which the wider recognition of women in public affairs was promoted. Soon after she went upon the lecture platform and addressed many literary and philosophical societies in behalf of the improvement of the condition of working women. She visited the United States three times to study the industries employing women and the religious aspect, particularly the practices of the Mormon Church. Queen Victoria made her publisher in ordinary to her majesty, granted her a pension of $250, and as a mark of respect presented her with a signed portrait. She visited the queen of Roumania in 1890 at the request of Victoria, for the purpose of recounting the opportunities for the employment of women in Britain. Among her publications are "Victoria Regia;" "Change upon Change;" "Three Visits to America;" "Drawbacks Connected with the Employment of Women," and "Original Contributions in Prose and Poetry."

FAKIR (fā-kēr), a Mohammedan religious mendicant who wanders from place to place. A fakir is regarded by the Mohammedan multitude as a character of sanctity, though fakirs are of the lowest priesthood. The term is applied also to the Anglo-Indian and the Hindu mendicants, though the latter are more properly called Gosavee. In some regions of the Mohammedan countries they live in communities, but usually the life is solitary. Their attire is coarse and generally black or brown, while the headwear consists of a black turban, over which is tied a red handkerchief. To gain the veneration of the lower classes they often mutilate their persons and practice absurd penance.

FALCON (fa'k'n), a long-winged, high-couraged, raptorial bird, which takes its prey as it moves. Technically, in falconry, the female alone is termed a falcon, the male, which is smaller and less courageous, being known as a tersel or tiercel. Naturalists generally apply the name to various birds of prey, which they separate into distinct groups, including the peregrine falcon, large northern falcon, desert falcon, merlin, and hobby. For symmetry, strength, and power of flight the falcon is the most perfect of the feathered race. The beak is strong and short-hooked at the point, the upper mandible having a notch or tooth on its cutting edge. In all species the legs are heavy and stout, claws sharp and long, and the wings powerful. The average length of falcons is about two feet. The peregrine is most commonly used in falconry and is exceedingly swift, its flight being fully 150 miles per hour.

FALCON.

FALCONRY (fa'k'n-rȳ), the pursuit of game by means of falcons or hawks. In ancient times the sport was called hawking and has been traced back to a period prior to the Christian era. At one time, in Germany, even kings and nobles devoted the greater portion of the hunting season to it. After the Norman conquest, England indulged in the sport until the rank of the individual was indicated by the particular species of hawk carried on his gloved hand or wrist. Later it went largely out of fashion, but at present an attempt is being made to restore this sport, which is attended with growing success. The training of hawks is a matter requiring much care and patience. They are usually taken while young and hooded with a piece of leather, leaving an aperture for the beak, trained to sit on the hand and to eat from the lure. The lure is a device made of a piece of wood or leather covered with the wings and feathers of a bird and attached to a cord, to which a piece of meat is fastened. The falconer swings the baited lure round and round his head, accompanying the action by some call. When the falcon has been taught to obey the lure, it is trained to catch live birds, and soon learns to seize the game. The hood is kept on the falcon during hunting excursions, until the bird is wanted to fly.

FALK (fälk), **Paul Ludwig**, jurist and

statesman, born in Silesia, Germany, Aug. 10, 1827; died July 7, 1900. He was educated at the University of Breslau, entered upon the practice of law in 1847, and became counselor of the court of appeals at Glogau in 1862. When the North German Confederation was formed in 1867, he was elected representative. The following year he was appointed privy counselor to the minister of justice, in which capacity he aided in codifying the laws of the German Empire. In 1872 he became minister of public worship and instruction, and, when Prince Bismarck decided to curtail the privileges of certain church worship, he brought forward the repressive measures known as the May Laws. When negotiations for the restoration of harmony between the state and church were begun in 1879, he retired from office, accepting at the same time a peerage for his son. He was appointed to the presidency of the court of Hamm in 1892.

FALKLAND ISLANDS (fak'land), a group of islands belonging to Great Britain, situated in the South Atlantic Ocean, about 275 miles east of the Strait of Magellan. The total number of islands is about one hundred, with an area of 6,490 square miles, of which the two larger are East Falkland and West Falkland, containing respectively 3,000 and 2,300 square miles. The surface is hilly, with bogs extending from various points on the shore toward the interior region. There is an entire absence of trees, though a large variety of grasses abounds, on which herds of cattle and sheep are reared with much success, this constituting the principal industry. In some of the islands are myriads of penguins, while other sea-fowls and valuable fisheries abound. The climate is healthful and well adapted to the production of cereals found in temperate climates. This island group was discovered by John Davis (1550-1605), Aug. 14, 1592, and was named by Captain Strong while cruising in 1689, in honor of Lord Falkland. The first permanent settlements were made by the French, and later immigration followed by the Spaniards and English, the latter securing permanent control in 1833. Stanley, on the coast of East Falkland, is the chief town and seat of government. It has a population of 750; the island group has a population of 2,580. The principal exports are wool, hides, skins, and tallow. There are imports of machinery, wearing apparel, and building material. Local government is administered by direct appointees of the crown, and education supported by government grants and local taxation.

FALLING BODIES, a term used in physics when demonstrating the force of gravity. All terrestrial bodies, if unsupported, fall or move toward the earth's center by this force. That the acceleration due to gravity is the same for all masses was proved by Galileo. His experiments consisted in dropping unequal balls of iron from the top of the leaning tower of Pisa. He discovered that, whatever their masses, the balls reached the ground at the same instant. Using balls of iron and wax, he found that the iron balls struck the ground first, and concluded that bodies less dense are similarly influenced by gravity, and that the unequal velocities are due to the resistance of the air acting on different extents of surface. It was later demonstrated by Newton that all bodies in a vacuum fall with the same velocity, which proves that the effect of gravitation on bodies is proportional to their masses, but the resistance of the air causes the apparent exception to the law.

In a body falling freely from a state of rest the velocity at the end of the first second is equal to about 32.16 feet per second. At the end of the next second it is 32.16 times two, and equals 64.32 feet per second; at the end of the third second it is 144.72 feet, etc. If the time is known, the distance through which a falling body passes may be found by multiplying the square of the time in seconds by 16.08. Thus, in two seconds, $2x2x16.08=64.32$. The acceleration varies in different parts of the earth's surface, being least at the equator and increasing slightly with the latitude to a maximum at the poles. The distances fallen through in successive seconds increase at the odd numbers. Thus, a body falling from a state of rest passes through 16.08 feet during the first second, and attains a velocity of 32.16 feet. During the next second it falls through $3x16.08$ feet, or 48.24 feet, and the third second $5x16.08$ feet, or 80.40 feet. The total distance in feet through which a body falls in a given time is proportional to the square of the time, and is equal to the square of the time in seconds multiplied by 16.08. Thus, a falling body passes four times as far in two seconds as in one second, and nine times as far in three seconds as in one second. In the first second a body falls 16.08 feet, and in the next second 48.24 feet. At the end of the second second it has fallen through a total distance of $48.24+16.08=64.32$ feet. Thus, 64.32 feet is four times 16.08 feet, or $2x2x16.08$, as per the statement above.

FALLOW LAND, the name applied to ground that is left uncultivated to regain productiveness after continuous cultivation, and plowed in the summer, often called summer fallow. All land, no matter how productive, if used continually for a number of seasons, becomes partly exhausted, and this method is used to allow it to rest and recover its fertility. In other instances various forms of fertilizing are used for the same purpose. Strictly speaking, the land should be allowed to rest the entire year, but the term is also applied to various modes of treatment, such as plowing the ground immediately after the removal of a spring crop, known as bastard fallow; or planting the ground with some crop that can be planted in rows, as corn or potatoes, which

admits of the intermediate spaces being cleaned, stirred, and pulverized during the growth. The latter is known as green-crop fallow.

FALLOWS, Samuel, American theologian, born in Pendleton, England, Dec. 13, 1835. When ten years of age he came to the United States, graduated at the University of Wisconsin in 1859, and was elected vice-president of Gale College, Galesville, Wisconsin. The Methodist Episcopal Church ordained him as minister in 1861. Soon after he entered the Union service as chaplain, and on account of persistent courage became known as the "fighting parson," attaining to the rank of brevet brigadier-general. Shortly after the war he became pastor in Milwaukee, and in 1871 secured an election to the office of state superintendent of public instruction of Wisconsin, to which office he was twice re-elected. He became president of the Illinois Wesleyan University in 1874, rector of the St. Paul's Reformed Episcopal Church of Chicago in 1875, and the following year engaged as editor of the "Appeal." He published a number of important educational works, including "Handbook of Synonyms;" "Dictionary of Synonyms and Antonyms," and "Hand-book of Americanisms and Britainisms."

FALL RIVER, an important manufacturing city of Massachusetts, in Bristol county, on an arm of Narragansett Bay, about fifty miles southwest of Boston. Its location is at the head of deep-water navigation, forming the terminus of steamships from New York and other ports. It is the greatest cotton goods manufacturing city in America, employing 2,200,000 spindles, this being about one-sixth of all the spindles operated in the United States. There are about seventy cotton mills. These institutions represent an incorporated capital of $25,000,000, and a total investment of nearly $50,000,000. The industry of printing calicoes and dyeing cotton goods is represented extensively, while numerous nail machines operate in the city and produce many thousands of kegs of nails annually. The streets of the city are regular, well paved and lighted, and are connected with suburban districts by electric car lines. Among the public buildings are a city hall, United States custom-house and postoffice building, and numerous public schools and institutions of higher learning. The city library contains 50,000 volumes of published works. In 1887 the Durfee high school building was donated to the city. It is a fine structure of granite, and is well equipped with apparatus for teaching the sciences. Population, 1900, 104,863.

FALSETTO (fal-sĕt'tō), in music, the artificial tone of the voice. The voice contains three registers—chest-voice, head-voice, and a third, which is not natural, and is called falsetto or false voice. It is usually blended, by practice, with the chest-voice so as to make no perceivable break.

FAMINE (făm'ĭn), a widespread and distressing scarcity of food, usually resulting from drought, war, flood, or insects. Tropical climates subject to irregular rainfalls are most commonly affected by famines, though defective economic systems, such as the absence of a diversity of food articles and imperfect means of transportation, are prolific causes. In the Middle Ages famines were more numerous than at present for the reason that modern communication and transportation make it possible to supply quite successfully the districts in want with the necessary means of sustenance. The most widespread famines of recent times have been experienced in Asiatic countries, particularly in India and China. The great famine visiting northwestern India in 1837-38 caused 800,000 persons to perish, and the one occurring in Bengal and Orissa in 1865-66 resulted in about a million deaths. In 1847 a famine visited Bengal, but it was not excessively destructive of human life for the reason that supplies were transported rapidly to the afflicted districts, though nearly a half million died during the great famine in 1877, which visited Bombay, Mysore, and Madras. It is estimated that 9,000,000 persons perished at the time of the great famine in China in 1877-78, while the one in 1888-89, caused by the overflow of the Yellow River, was equally destructive. One of the most remarkable famines of India occurred in 1897, which was followed by a very destructive and widespread dearth of food in 1900.

FAN, an instrument for agitating the air by the movement of a flat surface, especially for cooling the face or causing the movement of air in a room. Devices for cooling the face by agitating the air were in use among the Greeks and Romans, and were introduced into western European countries shortly after the Roman invasion of Gaul and Germany. Those generally used are made of palm-leaves, feathers, thin skin, wood, paper, or ivory, and are of various construction. Ventilating fans are propelled by steam or electric power. Those of the latter class have a simple motor with alternating electric currents, a fifty-volt transformer current usually being sufficient to propel the fan. These ventilating fans are frequently seen in department stores, offices, and dining-rooms, where currents of air are stirred up for the general comfort. In mining, for winnowing grain, urging combustion, cooling fluids, and other purposes contrivances of flat disks or waves are utilized, which, when propelled by machinery, revolve rapidly and induce strong currents, the force of the current depending upon the velocity at which the fan moves.

FANATICISM (fa-năt'ĭ-sĭz'm), the term used to designate intemperate zeal or ferocious enthusiasm. The spirit of fanaticism has frequently characterized political and

religious movements, in which advocates of reforms were unduly enthusiastic, and often resorted to radical measures in endeavoring to further their ends.

FANCY, in psychology, a term used in connection with imagination, of which it is a form. When the imagination combines the subjects it uses in such a way as to give a result that is pleasing, light, and playful, but still shows nothing of high purpose or of noble and cultivated taste, it is called fancy. Images of the fancy are dealt with by many of the poets and orators. The comparison made by Longfellow, in which the moon is likened to the paper kite of a school-boy, is a mere fancy. In early life the imagination inclines more commonly to the fanciful. This is evidenced by the productions of great writers, particularly of Shakespeare, whose early writings partake more of the fancy than do his later productions.

FANDANGO (făn-dăn'gō), a famous dance of the Spanish people, dating from the Moorish occupation of Andalusia, though it is rarely danced, except at theaters and in parties given by the lower classes. It is said to have come into favor on account of the ecclesiastical authorities in Spain threatening to prohibit dancing. Accordingly two parties were brought before the judges of a court, in which the fandango dance was given, and this resulted in its approval. In this form of dancing the parties never touch each other, but retreat, approach, and pursue each other in varied movements, voluptuousness being indicated by the movements.

FANEUIL (făn'el), **Peter**, merchant, born in New Rochelle, New York, in 1700; died March 3, 1743. He descended from a family of French Huguenots, and engaged as a merchant in Boston, where he managed a successful business. In 1742 he erected a public market at his own cost and gave it to the city. The building was destroyed by fire in 1761, but rebuilt by public taxation in 1763, and was used as a theater in 1775. At the time of the Revolution the patriots selected it for a meeting place, from which it came to be called "the cradle of liberty," and those taking part in the meetings were known as "Sons of Liberty." Faneuil Hall was remodeled in 1805 and one story was added. The main hall is eighty feet square. Pictures of distinguished Americans decorate its walls.

FARADAY (făr'a-dā), **Michael**, distinguished chemist and philosopher, born at Newington Butts, near London, England, Sept. 22, 1791; died Aug. 25, 1867. He was the son of a blacksmith, was apprenticed to a book-binder when thirteen years old, and showed a very early aptitude for the study of science and electric machinery. When Sir Humphrey Davy lectured on chemistry at London, in 1812, he obtained admission, and was soon after appointed assistant at the Royal Institute. He succeeded Davy to the chair of chemistry in 1827, and five years later was created a doctor of civil law. His valuable researches were carefully noted and much useful information regarding them was afterwards published in various works still held in high repute. The notable discoveries made by him include new compounds of carbon and chlorine, compounds of carbon and hydrogen, and numerous alloys of steel. In 1829-30 he made a series of experiments in the manufacture of glass for optical purposes. Later he experimented successfully in magnetism and electricity, which resulted in several useful discoveries. Oxford conferred upon him an honorary degree in 1832 and the academy at Berlin, Germany, made him an honorary member. Lord Melbourne granted him a pension of $1,500 a year, beginning in 1835, and a house at Hampton Court was given him in 1858. Among the most valuable works published by him are "Lectures on the Forces of Matter;" "Researches in Electricity;" "Chemical History of the Candle;" "Non-Metallic Elements," and "Chemical Manipulation."

FARALLONES (fă-răl-yō'nēs), an island group off the coast of California, situated thirty miles west of the Bay of San Francisco, and belonging to the state of California. There are six islands in the group, on the largest and most southern of which is a lighthouse with a flashing light of the first order, at an elevation of 360 feet above sea-level. Great numbers of gulls and murres breed on these islands and furnish vast quantities of eggs, which are gathered for the market of San Francisco. Many sea-lions and several species of seals frequent the group.

FAREL (fā'răl), **Guillaume**, eminent reformer, born in Gap, in Dauphiny, France, in 1489; died in Neuchatel, Switzerland, Sept. 13, 1565. It was the wish of his parents that he should engage in a military career, but he chose to pursue the calling of the ministry, and accordingly obtained admission to the University of Paris. He first supported the Roman Catholic Church with marked devotion, but afterwards became converted to the reformed faith, and labored with much zeal to spread the new doctrine in Switzerland. His success was most marked in Basel, Berne, and Geneva, where he secured a large following by reason of powerful sermons. The work of Farel had a marked influence on the life of Calvin, Erasmus, and Faber.

FARGO (făr'gō), a city of North Dakota, county seat of Cass county, on the Red River of the North, opposite Moorhead, Minnesota. Numerous railroads connect it with all portions of the northwest and furnish excellent transportation facilities for the vast quantities of wheat and other cereals that are marketed there annually. The city contains several flouring mills, an extensive depot for farm machinery, and numerous grain elevators. It also has a large trade in merchandise. The public school system is

supplemented by a Congregational College, Presbyterian Seminary, and Roman Catholic Academy. There are numerous municipal facilities and costly edifices. Fargo contains one of the most excellent cathedrals of the Catholic Church in the northwest. A great fire occurred in the city on June 7, 1893, in which about $3,000,000 worth of property was destroyed. Population, 1900, 9,589.

FARIBAULT (fâr-ę-bō'), county seat of Rice county, Minnesota, on the confluence of the Cannon and Straight rivers, about forty-five miles south of St. Paul. The surrounding country is fertile and contains many excellent farms and dairying establishments. Among the manufactures are woolen goods, clothing, machinery, and cigars. It is the seat of three Protestant Episcopal institutions: the Seabury Divinity College, Shattuck School for boys, and St. Mary's School for girls. There are electric lights, pavements, waterworks, and street railways. The city is well connected by telephones and railroad lines, has excellent public schools, and a large trade in merchandise. Population, 1900, 7,868.

FARINELLI (fä-re-nel'lee), **Carlo**, celebrated singer, born in Naples, Italy, Jan. 24, 1705; died in Bologna, July 15, 1782. His voice was developed early in life and showed such a degree of culture that he became a favorite singer among the European monarchs of his time. Philip V. bestowed marked honors upon him, granting him special privileges at the court of Spain, and he was similarly honored by Ferdinand VI.

FARMERS' INSTITUTE (fär'stĭ-tūt), the organizations maintained in different states for the purpose of providing opportunities for discussion and advancement of agriculturists and stock-raisers. The plans under which farmers' institutes are organized differ in various states. In some they are conducted under the direction of officials appointed by the state board of agriculture, while in others the states make annual appropriations, by means of which institute meetings may be organized and maintained throughout the agricultural districts. The course of study pursued includes topics relating to improved methods of cultivation, fertilization, care of machinery, stock-raising; wool, mutton, and pork productions, transportation to market, beautifying of farm life, and many other kindred subjects. It is usually customary to have experienced professors of agriculture and mechanic arts give a series of lectures in order to bring the practical experience of the central stations in direct contact with the practical cultivators of the soil, the rearers of domestic animals, the workers in dairy establishments, horticulturists, etc. In some states the institutes are in session for several weeks consecutively, while in others local meetings are held at various points in the county or district, thereby facilitating the attendance of a larger per cent. of the industrial classes. In Michigan and several other states the institutes are under the control of a board of agriculture. The state appropriation to defray the expenses of the institutes in New York aggregates annually about $15,000, while in Iowa the appropriation to each county may not exceed $50 per annum. Other states have plans whereby the same object may be attained, though the methods are very much diversified. The institute movement has progressed most successfully in the states of the north and northwest.

FARMERS' ORGANIZATIONS, the societies or parties organized by farmers for the purpose of bettering the condition of agriculturists, and influencing legislation favorable to the various lines of agriculture, horiculture, floriculture, stock-raising, and dairying. Among the first organizations of this kind was the Patrons of Husbandry, organized by William Saunders, Aug. 5, 1867. This was formed on the plan of fraternal societies, under which certain degrees were given to members. The subordinate lodges or granges organized under the system were governed by the National Grange and numbered about 26,000 in 1890. Later other organizations were formed, having a more or less political significance, among them the National Agricultural Wheel, National Farmers' Alliance, and the National Farmers' Political League. In 1892 a convention of delegates from the various farmers' organizations, together with delegates of the Knights of Labor and the people's party, was held in Omaha, Nebraska. A platform declaring their principles was adopted on the Fourth of July. Among the principles declared were those of a graduated income tax, free coinage of gold and silver, government ownership of telephones and telegraph lines, reclamation of lands from aliens, and the eight-hour labor law. Gen. J. B. Weaver, of Iowa, was nominated for president and Gen. James Field, of Virginia, for vice-president. The party organized in this way received 1,055,424 of the popular votes and twenty-two of the electoral.

FARMINGTON, a town in Middlesex county, Massachusetts, twenty-three miles east of Worcester. It has good railroad conveniences and extensive manufactures of cotton and woolen goods, boots and shoes, rubber goods, and machinery. There are excellent public schools and churches and numerous municipal facilities. It is also the seat of a state normal school. Population, 1900, 11,302.

FARNESE (far-neez'), a celebrated family of Italy that gave many eminent names to the republic of Florence and to the church. It descended from the early part of the 13th century, and several branches of it still exist. Among the famous works of art found at Naples are several associated with the Farnese family, among them "Farnese Hercules;" "Farnese Bull," and "Farnese Flora."

FAROE ISLANDS (fā′rō), a group of twenty-five islands situated in the North Atlantic, between Iceland and the Shetland Islands. The coast lines are largely rugged cliffs rising abruptly to a height of 500 to 2,000 feet, while the mountains of the interior contain extensive tablelands, none of which exceed 3,000 feet above the sea-level. These islands belong to Denmark, and are governed by resident representatives appointed under the direction of the king. The inhabitants are descendants of Scandinavian people who settled there largely in the 9th century. Strömöe is the largest island, and contains the capital, Thorshavn, which has a population of about 1,000. The islands are treeless, but contain valuable deposits of peat and coal. Building material and machinery are imported largely from Norway. The chief industries of the people consist of fishing, hunting, and sheep culture. Only seventeen of the islands are inhabited, the population being 11,850. The religion is exclusively Lutheran. Numerous schools are supported by government grants.

FARRAGUT (făr′a-gŭt), **David Glasgow**, celebrated naval commander, born near Knoxville, Tennessee, July 5, 1801; died in Portsmouth, New Hampshire, Aug. 14, 1870. He entered the navy as midshipman at the age of nine years, was promoted to a lieutenancy in 1821, and in 1851 secured an appointment as assistant inspector of ordnance. The long period of peace gave him little opportunity to distinguish himself as an officer, though he received a commission as captain in 1855. At the outbreak of the Civil War he was assigned to accompany an expedition against New Orleans, and with it set sail in February, 1862. After shelling the city without effect for a week, he succeeded in forcing a passage of the river in the dark on April 25, which caused it to fall and pass into the hands of the Federals under General Butler. Later Farragut took possession of Baton Rouge and Natchez, ran the batteries at Vicksburg, and joined the Union fleet above. He was made rear-admiral on account of his success at New Orleans. On Aug. 5, 1864, he attacked the Confederate fleet in the Bay of Mobile and compelled it to surrender, and thereby closed the port of Mobile by a successful blockade. The oversight of the contest was made by Farragut while lashed to the mast of his flagship, the Hartford; this is known as one of the most interesting episodes of the war. In 1866 congress created him a vice-admiral, and two years later raised him to the rank of admiral, a rank that had not existed in the United States navy prior to that time. His memory is fittingly commemorated by bronze statues in Washington and New York.

ADMIRAL FARRAGUT.

FARRAR (făr′ar), **Frederick William**, noted clergyman, born in Bombay, India, Aug. 7, 1831; died March 22, 1903. He was educated at King's College, London, and later became a scholar and fellow of Trinity College, Cambridge. While at the latter institution, several university honors were bestowed upon him, among them the chancellor's prize for English verse. In 1854 he became a deacon of the English Church, and was admitted into the priests' order three years later. For five years he held with distinction the head mastership of Marlborough College, in 1876 was appointed rector of St. Margaret's, London, and in 1883 became archdeacon of Westminster. As a writer he was as pre-eminent as in preaching the gospel, and gave to the world several excellent works on religious and moral philosophy, the most important being the "Life of Christ," which appeared in many editions and has been translated into various languages. Among his other productions are "The Witness of History to Christ;" "Life of St. Paul;" "Early Days of Christianity;" "Eternal Hope;" "Messages of Books;" "Darkness and Dawn," and "Fall of Man." He also published a number of works of an educational character, among them "Greek Grammar Rules;" "Families of Speech," and "Essays on Liberal Education."

FASCINATION (făs-sĭ-nā′shŭn), any irresistible influence that captures or controls the will or intellect. That human beings are more or less fascinated by certain natural influences is admitted on every hand, but some go so far as to seek to revive widespread belief in the evil eye, an influence that the superstitious thought existed, and by which individuals could be compelled to act contrary to their wishes. Some naturalists think that certain snakes and other animals have this power over mice, squirrels, and birds, but it has been neither satisfactorily explained nor demonstrated. However, some think that serpents emit narcotic fluids whereby the weaker animals become stupefied, while others regard it analogous to hypnotism.

FASHION (făsh′ŭn), the prevailing style of usages, ornaments, and dress that is adopted by society and accepted by its members in accord with a general law of interest. The fashions change from time to time, and are supposed to take form in line with the most serviceable in practice and the most elegant and decorous in design. When the various fashions of past ages are examined, it is found that the changes were rapid and marked, and that caprice was more often the cause than utilitarian motives.

FAST (fast), the withholding of all natural

food for a determined period; but, in another sense, the word is employed to denote abstinence from certain kinds of food. The origin of the practice is very obscure, but it probably did not at first occupy nearly so prominent a place in Christian rituals as that to which it afterwards attained. Among the ancient Egyptians fasting seems to have been associated with many religious festivals, notably that of Isis, but it was not compulsory. Among the Jews fasts were numerous, but the day of atonement was the only fasting day enjoined by the law of Moses. Mishna speaks of four others commemorating, respectively, the storming of Jerusalem by Nebuchadnezzar; the burning of the temple by Titus; the sacking of Jerusalem by Nebuchadnezzar, and the reception of the news of the destruction of Jerusalem by Ezekiel and other captives. Other fasts were proclaimed by royal or other authority on special occasions. The New Testament enjoins no stated fasts, but several came into vogue subsequently, the Lent fast taking the lead. In the third century the Latins fasted on the seventh day. The council of Mentz, in 813 A. D., ordered a fast the first week in March, the second week in June, the third week in September, and the last full week preceding Christmas. In the Roman Catholic Church there is a distinction between the days of fasting and of abstinence. The principal fast days of that denomination are the forty days of Lent; the ember days, these being the Wednesday, Friday, and Saturday of the third week in Advent; the third week in September; the first week in Lent, and Whitsun week. To these are to be added every Friday and the eves or vigils of Christmas, of All Saints, of Assumption of the Virgin, of Whitsuntide, and of the feasts of St. Peter and St. Paul. The Greek Church observes as fast days Wednesdays and Fridays; Easter, forty-eight days; Christmas, thirty-nine days, and several others. The Episcopal and Anglican churches recognize the fast as being praiseworthy, but give no directions concerning it. Their fasting days are every Friday, except Christmas day; the forty days of Lent; the three rogation days before Holy Thursday, and the ember days at four seasons.

FAT, an animal substance of more or less oily character deposited in vesicles in the adipose tissue. It is a compound of oxygen, hydrogen, and carbon, and forms a considerable layer under the skin, but also collects in considerable quantities around certain organs, as the heart and the kidneys. Fat surrounds the joints and exists in large quantities in the marrow of the bones. Being light, soft, and elastic, it forms an excellent packing material in the body, giving a rounded contour and smooth surface to the frame. Its chief use is for the purpose of nutrition, but, being a bad conductor of heat, it enables the body to retain the heat which it has generated. In extremely cold climates fat is the principal food of man; for instance, the Eskimos subsist almost wholly on the fat of bears, seals, and whales during the season of extreme cold. Fatty degeneration is an abnormal condition brought on by defective nutrition or excessive use of alcohol, on account of which fatty granules take the place of healthy protoplasm in the heart, kidneys, muscles, and arteries. The sufferer retains the appearance of health, but is impaired by want of energy and muscular weakness.

FATALISM (fā′tal-ĭz′m), the doctrine of an unchangeable destiny, according to which all things are pre-established by the Creator, or by the fixed laws of nature. It has given rise, in theory, to doctrines of predestination, and, in moral science, to such systems as those of Hegel and Spencer. The ancient Greeks held to the belief in fate so strongly that they regarded it the controlling power of even the gods, while in modern times the Mohammedans regard all things predestined or decreed by fate, and consider the occurrence of an accident an impossibility.

FATES, in Greek mythology, the deities supposed to preside over the birth, life, and fortunes of man. They were three in number—Clotho, Lachesis, and Atrapos. Clotho held the spindle, Lachesis drew out the thread of man's destiny, and Atrapos cut it off. The three were regarded as the regulators of the duration of human existence and the destinies of mortals, and places were consecrated to them in Corinth, Sparta, Olympia, Thebes, and other parts of Greece. In statuary they are represented both as young women and as matrons.

FAURE (fōr), **Francois Felix**, president of France, born in Paris, Jan. 30, 1841; died Feb. 16, 1899. He became a ship-owner of Havre and served as president of the chamber of commerce of that city. In the Franco-Prussian War of 1870-71 he distinguished himself, and later assisted in putting down the Commune, receiving as a mark of distinction the ribbon of the Legion of Honor. In 1881 he was elected to the chamber of deputies as a republican, and became under-secretary of state, which position he held until 1882. In 1885 he was chosen a representative in the Brisson cabinet, under-secretary of state again in 1887, and vice-president of the chamber in 1894. On the resignation of Casimir-Perier in 1895, he was elected president, receiving 430 votes, while 361 were cast for Brisson. An unsuc-

FRANCOIS FELIX FAURE.

cessful attempt to assassinate him was made on July 14, 1896. He is author of "Budget of France" and "Principal Countries of Europe Since 1888."

FAUST, or **Fust** (fowst), **Johann**, celebrated printer, born in Mentz, Germany, about 1480; died Feb. 24, 1538. He was associated with Gutenberg in promoting the invention and introduction of printing. Writers generally credit him with furnishing the capital necessary to introduce the printer's art. His methods were preserved as secrets until Mentz was sacked in 1462, after which the workmen settled in different parts of Europe and made known much relating to the apparatus and materials employed. Faust is credited with printing a Bible in the Latin, which is now in the Mazrin library. However, his published matters were almost entirely in the German, including various texts, proclamations, and short treatises.

FAUST, **Johann**, noted magician, who became celebrated in literature as the hero of Goethe's "Faust." It is thought that he was a native of Anhalt, in Germany, and flourished there in the 16th century. He studied theology in Ingolstadt, became a magister at the age of nineteen, and soon after abandoned theology for the study of astrology, medicine, and magic, in which he afterwards instructed Johann Wagner, a clergyman's son at Wasserburg. It is said that he made a contract with Satan, which he wrote in his own blood. The terms of the contract provided that Satan was to serve him twenty-four years, and at the expiration of that time his soul should pass into the possession of the evil one. This story, though untrue in many details, is made the subject of Goethe's celebrated drama, "Faust," and likewise of Gounod's famous opera known by the same name. The story of Faust and Wagner still forms a conspicuous part in many of the theatricals and operas of Europe.

FAVRE (fävr), **Jules**, statesman, born in Lyons, France, March 21, 1809; died in Versailles, Jan. 20, 1880. He studied law and located at Paris in 1835, where he became prominent as a lawyer and liberalist. In 1848 he became secretary-general of the interior and opposed the presidency of Louis Napoleon. He also spoke in opposition to the measures that led to the Franco-German war in 1870-71, though afterwards supported the national cause. Later he served as minister of foreign affairs. In 1876 he was elected as senator, distinguishing himself by brilliant oratory.

FAWCETT (faw'set), **Henry**, political economist, born in Salisbury, England, in 1833; died Nov. 6, 1884. He graduated with honors at Cambridge in 1856, studied law at Middle Temple, but soon after discontinued it. While out hunting with his father in 1858, a gun was discharged by accident and caused the loss of his sight. This misfortune did not discourage him, but rather increased his vigor and interest in study. He became professor of political economy at Cambridge in 1863, entered parliament as an advanced liberalist in 1865, and two years later married Millicent Garret, who attained a reputation as speaker and writer on the civil rights of women. His earnest work in parliament tended toward reform measures in India, and caused Epping Forest to be opened for the common people of London. In 1880 he became postmaster-general under Gladstone, inaugurating several reforms in the postal service. A national memorial at Westminster Abbey was erected to him. He is the author of a number of books, including "Manual of Political Economy;" "Economic Position of the British Laborer," and "Free Trade and Protection."

FAWKES (fawks), **Guido**, conspirator, born in Yorkshire, England, in 1570; hanged Jan. 31, 1606. He was the leader in the famous Gunpowder Plot, by which the king and parliament were to be blown up on Nov. 5, 1605. See **Gunpowder Plot**.

FAYAL (fī-al'), an island of the Azore group, belonging to Portugal. It has an area of seventy square miles and a population of 31,290. The soil is fertile. Its climate is favorable to Europeans, and there are productions of live-stock, cereals, fruits, and miscellaneous manufactures. Horta, situated on an eminence 3,000 feet above sea-level, is the principal town.

FAYETTEVILLE (fā-et'vil), county seat of Cumberland county, North Carolina, at the head of navigation on the Cape Fear River. Prior to the Civil War it was the capital and most important city of the state, but during the war it suffered materially. Several railways and steamboat lines connect it with commercial centers of the east. The manufactures include cotton goods, vehicles, ice, woodenware, and tobacco products. It is the seat of good schools and of the state normal school for Negroes. Its municipal facilities include waterworks, sewerage, and electric lights. Population, 1900, 4,670.

FEATHERS, the dermal growths forming the external covering or plumage of birds. Though chemically similar to the hair on the skin of mammals, they differ widely in form. As a general rule, feathers consist of a central shaft, which is tubular at the base, and imbedded in the skin like a plant in the earth. On either side of the shaft is a web, beard, or wane consisting of barbs and barbules. Feathers are of two kinds—quills and plumes. The quills grow mainly on the wings and tail, while the plumes are generally diffused. Being poor conductors of heat, they are useful in preserving the temperature of the bird. They are renewed once or twice a year; this is called molting. Some feathers are known as down and are the first feathers of the birds. Most birds are provided with an oil-gland at the base of the tail, whose secretion the animal distrib-

utes at various times over the feathers by means of the bill. Feathers form an extensive article of commerce, and are used for ornaments, plumes, bedding, pens, and many other useful purposes.

FEDERAL PARTY (fĕd'ĕr-*al*), the first political party having control of the government after the adoption of the constitution. When the constitution had been framed and sent by congress to the states, in 1787, for ratification or rejection, those favoring acceptance were called federalists and those opposing it anti-federalists. The federal party was led by Washington, Pickering, Adams, Ames, Jay, Hamilton, and Morris. By it the machinery of the new government was established, but in this enterprise the prominent leaders of the anti-federalists were consulted. The district, circuit, and supreme courts were organized by the federalists; the departments of state, attorney-general, treasury, and war established; the debt created by the continental congress was funded; the debts of the states caused by the Revolution were assumed and funded; plans to repay money borrowed from Holland, France, and Spain were made, and, in 1791, the first national bank of the United States chartered. A strong opposition to some of these measures was conducted by the anti-federal party under the leadership of Jefferson, Monroe, Randolph, Madison, Gallatin, Gerry, and others, who afterwards became leaders of the democratic-republican party. In order to secure the consent of the southern and agricultural states, it was necessary for the federalists to consent that the national capital be located on the banks of the Potomac River.

The second plan in organizing the nation was the founding of the bank of the United States under the leadership of Hamilton. In 1789 the system of levying duties on imports was commenced. Each of these measures was carried out by a strict sectional vote, and the agricultural sections of the north and the south began to oppose the tariff system, which gave Jefferson and Madison a source of strength in organizing the new party. Later the federalists endeavored to bring the country into war with France; this being prevented only by the policy of Adams, but it tended to divide the party. In 1798 the passage of the alien and sedition laws forever destroyed its popularity. The party succeeded in the election of Washington and Adams, the latter being defeated by Jefferson, in 1800, for re-election by a decisive vote. As an opposition party it took a strict-constructionist ground, while some of its leaders engaged in projects for the disruption of the Union. The policy pursued by the party during the War of 1812, and their distrust of the people, caused their strength to wane and ultimately destroyed all hopes of permanent success.

FEEHAN, Patrick A., Catholic prelate, born at Killenaul, Ireland, Aug. 29, 1829. At the age of sixteen years he entered Castle Knock College, where he studied two years, and shortly after began the study of philosophy and theology at Maynooth College. In 1852 he emigrated to America, was ordained priest in the latter part of that year, and later served as professor of moral philosophy and sacred history in the Seminary of Carondelet. In 1865 he became bishop of the see of Nashville, where he was successful in reorganizing the diocese, which had been demoralized during the war. In 1880 he was appointed first archbishop of the archdiocese of Chicago in recognition of the valuable services rendered in the south.

FEELING, in psychology, the power of the mind by which it is capable of experiencing or perceiving a mental act connected with some need or activity arising through the physical or the psychological nature. Psychical feelings have a purely mental source and arise from some conception or mental state. They are connected with some desire or activity, are accompanied by pleasure or pain and ordinarily preceded by knowledge, leading to volition. The feelings are the source of all joy and sorrow, and furnish the motives in view of which we choose to act or do. At first thought it may appear that knowledge alone leads to volition, but the influence exercised by desire and aversion is too apparent to be left out of account. Feelings are classified as emotions, affections, and desires. The simple feelings, as of joy and comfort, are emotions; those that go out toward an object, as of love, are affections, and those in which a wish to possess is manifested, as to possess food or clothing, are desires. See **Touch.**

FELIX, Antonius, or Claudius, Roman governor of Judæa from 51 to 62 A. D. He married Drusilla, who, according to Tacitus, was the daughter of Antony and Cleopatra. The government of Felix, as described by Josephus, was vigorous and successful, clearing the district of robbers and holding the Jews in submission. His connection with Drusilla was questionable, and, when Paul appeared before him and spoke of righteousness and temperance and alluded to the judgment to come, he trembled in fear and consciousness of being unworthy. He was recalled in 62 A. D. on account of charges preferred against him by influential Jews, left Paul in prison, and barely escaped a death sentence.

FELLAH (fĕl'lä), an Arabic word meaning peasant or farmer, and especially applied to the laboring population of Egypt in a contemptuous sense. They form the bulk of the population and are descendants of the ancient Egyptians, intermingled with Arabs, Syrians, and other races of Africa and Eurasia. In social position they are inferior to the Bedouins. The men are of medium height, have a dark color, large head with facial angle almost 90°, thick lips, and small hands and feet. The women tattoo them-

selves and marry at an early age. Fellahs exhibit the moral qualities of the ancient Egyptians, being intelligent, grave, and sober on the one hand; but idle, jealous, licentious, and of unbending obstinacy on the other.

FELSPAR, or **Feldspar**, a group of minerals quite abundant in most parts of the world. Felspar is the principal constituent of granite, gneiss, greenstone, and many other rocks; while clays seem to have resulted very generally from its decomposition. The minerals of this group occur in crystals and crystalline masses, are vitrous in luster, and break rather easily in two directions at right angles to each other. The colors are usually white, flesh-red, bluish, or greenish. All kinds of felspar are so hard as not to be easily scratched with a knife. They are fused with difficulty, but are quite soluble in acids. There are several fine varieties, including those known as potash felspar, lime felspar, and soda felspar. A nearly colorless variety, known as moonstone, is often cut into ornaments, and is prized almost as a gem. Another variety with golden-yellow specks, called sunstone, is very rare and beautiful and commands high prices. The Labradorite and Amazon stone are also esteemed as precious stones. In decomposition felspar not only yields clay, but also the mineral kaolin, both of which are essential elements in the manufacture of fine pottery and porcelain. Maine, Connecticut, New York, and Pennsylvania are the most important felspar-producing states.

FELT, a kind of cloth made without weaving by taking advantage of the natural tendency of the fibers of hair and wool to interlace with and cling to each other. The materials are carded more or less perfectly, steamed or moistened with hot water, and passed between beaters and rollers which press them into compact cloth or felt. This class of material is used extensively for carpeting, and in padding coats, caps, cloaks, and other garments. It also serves in making table covers, carriage-linings, upholstery work, piano hammers, and sheathing boilers and hot-water reservoirs. When saturated with pitch, coal tar, or asphalt, it is used for covering sheds and similar buildings. Beaver hats are made in the same manner of the fur of beavers, rabbits, raccoons, and other animals.

FENELON (fā-nęh-lôn′), **Francois de Salignac de la Mothe**, prelate and author, born in the Chateau of Fenelon, France, Aug. 6, 1651; died Jan. 7, 1715. He was trained at home until twelve years of age, when he was taken to Cahors, and afterward given a liberal education in Paris. When twenty years of age he entered the seminary of St. Sulpice, where he studied theology and received holy orders in 1675. In 1678 he was appointed director of an institution in Paris for the reception of females who had been converted to the Catholic faith. Being highly successful in attending to the duties incumbent upon him, he was placed at the head of a mission detailed to preach among the Protestants in Saintonge and Poitou. Louis XIV. recognized his eminent ability by an appointment as preceptor to his grandson, the duke of Burgundy, in 1689. His merits in this capacity were recognized by a royal appointment to the abbey of St. Valery, and soon after to the archbishopric of Cambrai. The exceptional ability and breadth of character of Fenelon were shown in a long controversy with Bossuet, which ended March 12, 1699, by an adverse decision of the pope. In the invasion of France by the allied forces the commanding general recognized his liberality and efficiency by ordering that the palaces and stores belonging to the archbishop of Cambrai should be spared. Perhaps, no life of the 17th century presents a greater devotion to the cause of Christianity and the elevation of mankind in moral goodness than that of Fenelon. His body was buried in the cathedral of Cambrai. The publications of Fenelon embrace treatises on theology, philosophy, literature, history, and oratory, and have appeared successively in twenty large volumes. The most noted are "Maxim of the Saints" and "Temporal Power of the Mediæval Popes."

FENIANS (fē′nĭ-ȧns), the name derived from a class of ancient Irish warriors, the Fianna or Fionna, founded as home guards in the 3d century, and applied to a political association that has for its aim the forcible liberation of Ireland from British sovereignty. The Fenian movement of the last century dates from 1857, when John O'Mahoney, James Stephen, O'Donovan Rossa, and other prominent leaders established a brotherhood in America. The object was to make the United States the base for operations in Ireland and Canada against the English, the central headquarters being in New York City. Large sums of money were collected to organize for aggressive hostilities, and a convention was held at Chicago in 1863 for the purpose of formulating plans. An attempt to invade Canada was made in 1866, but the object was frustrated by a capture of the stores of arms and provisions by United States authorities. About the same time an uprising in Ireland was suppressed by seizing the "Irish People," a Fenian publication at Dublin, and arresting a number of leaders. Another effort was made to invade Canada in 1871, which also proved unsuccessful. An attempt to destroy British ships and prevent ship-building by the use of dynamite was designed in 1883, though the enterprise met with little success, the principal promoters being apprehended and sentenced to penal servitude for a term of years. Within recent years the brotherhood, although having many sympathizers in Europe and America, has not pursued active operations, but organizations are still maintained.

FENNEL (fĕn'nĕl), a fragrant umbelliferous plant cultivated in gardens to a considerable extent for its aromatic qualities. The flowers are small and yellow or white, and the leaves, sometimes used in cookery, are finely divided. Among the common varieties are the giant fennel, common fennel, sweet fennel, and Indian fennel. The seeds are carminative, and are used in medicine.

FERDINAND I. (fĕr'dĭ-nănd), emperor of Germany, born in Alcala, Spain, March 10, 1503; died July 25, 1564. He was the son of Philip I. and brother of Charles V. of Germany, whom he succeeded as sovereign of the German Empire in 1556. He married Princess Anna of Hungary in 1521, became king of Bohemia and Hungary at the death of Louis, brother of his wife, in 1526, though his claim was contested, but by the aid of the Turks he secured recognition. Ferdinand was elected emperor on the abdication of Charles V., and during his brief reign attained a reputation for ability, justice, and enlightenment. Among other wholesome measures, he reformed the monetary system, conciliated his subjects in religious affairs, and added Hungary and Bohemia to his empire. He was succeeded on the imperial throne by his son, Maximilian II.

FERDINAND II., emperor of Germany, born in Grätz, Austria, July 9, 1578; died in Vienna, Feb. 15, 1637. He was the grandson of Ferdinand I., being the son of Charles, duke of Styria. His education was wholly under the Jesuits. In 1619 he ascended the throne. The training and sentiment of Ferdinand were in strong opposition to the Protestant church, and he began early in his reign to seek the extermination of all holding to that confession of faith. The religious war that commenced in the duchy of Styria and Bohemia soon spread over a large portion of the empire and the adjacent countries, and has gone down in history as the Thirty Years' War. It began to appear that the Protestant faith would be forever stamped out of Europe under the leadership of the imperial forces by Wallenstein, when Gustavus Adolphus of Sweden unexpectedly crossed into Germany, meeting the imperial forces at Lutzen on Nov. 6, 1632, and there dealt a complete defeat to the designs of Ferdinand. The ability demonstrated by the Swedish generals was more than equal to that of the Austrian leaders. Shortly after the battle of Lutzen, Ferdinand caused Wallenstein to be assassinated for the reason that he feared the rising power of that general. His reign was marked with many disastrous battles, while armies organized under his imperial command left nothing but ruin and desolation in their track.

FERDINAND III., emperor of Germany, born in Grätz, Austria, July 20, 1608; died April 2, 1657. He was the son of Ferdinand II. and succeeded him to the throne in 1637. His disposition was milder than that possessed by the father, and he also showed less fanaticism in his support of the ecclesiastical party. Religious toleration was granted in most parts of the empire, and the German nation began to recover from the fearful ravages of the great wars that had demoralized trade and destroyed more than half the population. Concessions were granted also in the interest of peace to independent princes, while France obtained part of Alsace and Lorraine, and Sweden secured Western Pomerania. The German Empire practically ceased to exist at the death of Ferdinand III., and was not re-established until the new German Empire rose under William I., after the close of the Franco-Prussian War in 1870-71.

FERDINAND I., surnamed the Great, first sovereign of independent Castile, born in the year 1000; died Dec. 27, 1065. He succeeded to the throne in 1035. In 1053 he defeated his brother, Garcia III., king of Navarre, who had attacked his army, and extended his dominions by annexing a number of provinces previously governed by the defeated sovereign. He entered upon a plan early in his reign to suppress the Moors, for which purpose he extended the Christian frontier from the Douro to the Mondego, and reduced to vassals the emirs of Saragossa, Toledo, and Seville. Shortly after he claimed the title of emperor of Spain, though a decision rendered at the conference held in Toulouse conceded him only the portions conquered from the Moors.

FERDINAND II., king of Leon, younger son of Alfonso VIII., ascended the throne in 1157; died in 1188. His reign of thirty-one years is obscure, but is marked most distinctly by the successes over the Moors and the incorporation of the noted military order of Alcantara under sanction of Pope Alexander III. in 1177. His death occurred at Benavente, and his son, Alfonso IX., succeeded him.

FERDINAND III., king of Castile, known as Saint Ferdinand, son of Alfonso IX., born in 1199. Henry I. of Castile died without issue in 1217, and Ferdinand III. was proclaimed king in 1230, immediately succeeding his father. The events for which his reign is most distinguished include the vigorous wars waged against the Moors. His most celebrated victories were those at Ubeda in 1234, at Cordova in 1236, and at Seville in 1248. In the latter part of his reign he planned an expedition to Africa, but died before his hopes could be realized, his death occurring at Seville on May 30, 1252. Pope Clement IX. canonized him in 1671 on account of his zeal in the Christian cause. The Spanish calendar designates his fast-day on May 30.

FERDINAND IV., king of Castile and Leon, born in Seville in 1285, and succeeded his father, Sancho IV., in 1295. His reign of seventeen years became renowned by several successful wars against the Moors. His

death occurred at Jaen while on a campaign, Sept. 7, 1312.

FERDINAND V., king of Castile, II. of Aragon, III. of Naples, and II. of Sicily, born in Aragon, Spain, March 10, 1452; died Jan. 23, 1516. He was the son of John II. of Navarre and Aragon; was recognized heir-apparent to the crown on the death of his brother Carlos in 1461, and was associated with his father in the government of Aragon as early as 1468. About the same time he was declared king of Sicily by his father. In October, 1469, he married Isabella, the sister and heir of Henry IV. of Castile, at Valladolid. When Henry IV. died in 1474, Ferdinand and Isabella were recognized joint sovereigns of Castile. His zealous support of Catholic sovereigns led to the expulsion of 160,000 Jews and the termination of Moorish power in Spain in the year 1492. Soon after he added Navarre and Naples to his possessions and formed the entire Iberian peninsula into one state, with the exception of Portugal. The most interesting event connected with his reign is the discovery of America by Columbus, though the honor of granting imperial support belongs wholly to Isabella. Ferdinand V. was a crafty and ambitious ruler, but in character he lacked both stability and veracity.

FERDINAND VI., king of Spain, son of Philip V., born in Madrid, Sept. 23, 1713; died Aug. 10, 1759. He ascended the throne in 1746, and entered at once upon a vigorous attempt to conclude the war with England that had waged since 1739, which resulted in the treaty of Aix-la-Chapelle in 1748. Dying without issue, he was succeeded by his half-brother, Charles III.

FERDINAND VII., king of Spain, born in Ildefonso, Oct. 13, 1784; died Sept. 29, 1833. He was the eldest son of Charles IV. and of Maria Louisa of Parma; became prince of Asturias in 1788, and, when his father was forced to abdicate on account of a popular rising in March, 1808, he ascended the throne. A month later Napoleon compelled him to abdicate and conferred the sovereignty upon Joseph, brother of Napoleon. When the imperial army of France was defeated at Vittoria on June 21, 1813, by Wellington, Ferdinand was permitted to re-enter Spain and occupy the throne on the condition that he would cause the English to be expelled from the peninsula. The arbitrary reign of Ferdinand caused an insurrection in 1820, but an army was sent to aid him by Louis XVIII. of France, by which his authority again became supreme in Spain. The act of 1713, passed during the reign of Philip V., excluded women from the throne of Spain, but this Ferdinand set aside to make place for his daughter, Isabella, and thereby excluded his brother, Don Carlos. The reign of Ferdinand was generally unsuccessful, being marked by numerous insurrections, the loss of most of the colonial territory in America, and a consequent widespread interference with commercial and manufacturing enterprises in Spain.

FERDINAND I., king of Naples, son of Alfonso V. of Aragon, born in 1424; died Jan. 25, 1494. Although he succeeded to the throne in 1458, he was not recognized by Pope Calixtus III., who championed the cause of John of Anjou. The latter defeated him July 7, 1460, but, when Pius II. recognized Ferdinand, he secured a victory over John of Anjou, Aug. 18, 1462, thereby attaining supremacy.

FERDINAND IV., king of Naples, born in Naples, Jan. 12, 1751; died Jan. 4, 1825. His father ascended the throne of Spain in 1759, and Ferdinand became his successor on the throne of Naples under a regency. He married Marie Caroline, daughter of Empress Maria Theresa, in 1768. His government was disturbed several times by the invasions of Napoleon, but he was finally permitted to reign independently from Dec. 12, 1816. His incumbency was marked by a despotic and arrogant spirit, though he had promised to grant a constitution as a condition of being permitted to resume the crown.

FERDINAND I., prince of Bulgaria, duke of Saxe, born in Vienna, Austria, Feb. 26, 1861. He was chosen prince of Bulgaria on July 17, 1887, by the grand national assembly at Tirnova, subscribed to the constitution, and on Aug. 14, 1887, assumed the reins of government under the title of Ferdinand I., although his election was not confirmed by the sultan of Turkey or by the treaty powers. On April 8, 1893, he married Marie Louise, daughter of the duke of Parma of the house of Bourbon. Shortly after he joined the Greek Church, which course was taken as a step toward securing the confidence of the Russian government, and his policy since has been marked largely by influences exercised through Muscovite diplomats, though in the main he has been eminently successful.

FERGUS FALLS (fĕr'gŭs fals), a city of Otter Tail county, Minnesota, on the Otter Tail River. Being the county seat, it has a fine courthouse. It is joined with other cities by important railroad connections, has a state high school and is the seat of a Norwegian Lutheran college. The surrounding country is fertile and yields large quantities of wheat, while the manufactories produce flour, cigars, machinery, and paper. The Otter Tail River supplies an abundance of water power, by which various manufactories, an electric light plant, and mills are operated. Population, 1900, 6,072.

FERGUSON (fĕr'gu-sŏn), **James**, astronomer, born near Keith, Scotland, in 1710; died in London, Nov. 16, 1776. He descended from poor parents, studied astronomy while a boy tending sheep, and later utilized his careful observations for constructing a celestial globe and astronomical apparatus. Subsequently he took a course of training at Edinburgh, where he became skilled in

mathematics and drawing, and later supported himself by making portraits. Removing to London in 1743, he engaged in painting, and gave a course of lectures on experimental astronomy. George III., then prince of Wales, was attracted to his lectures, and afterward gave him a pension of $250 a year. Among his principal works are "Lectures on Mechanics;" "Astronomy Explained upon Newton's Principles," and "Select Mechanical Exercises."

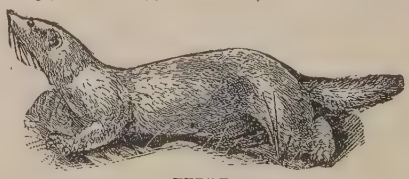
FERMENTATION (fĕr-mĕn-tā'shŭn), a chemical decomposition of an organic compound induced by chemical agents or by living organisms. In the former, called unorganized or chemical ferments, the enzyme causes a structural change without losing its identity, as in digestion; while in the latter, called organized ferments, the action is due to the growth of the ferment, as in the formation of acetic acid from alcohol by the action of the vinegar plant. The various organisms that produce fermentation apparently derive their nourishment from the original compound, and yield products that are poisonous to the ferment. It is for this reason that chemical decomposition ceases when fermentation products are in excess, or the nutriment is exhausted. It is arrested by certain foreign substances called antiseptics, and by heat and cold. There are several kinds of fermentation, the name applied depending upon the specific product obtained. In alcoholic fermentation the sugar contained in liquids is converted into carbonic acid, alcohol, and glycerine; in acetic, the spirituous liquors become acid and produce acetic acid, and in putrid fermentation, organic substances are altered in various ways, the alteration depending upon the nature of the substance, and poisonous gases are generally set free. Besides these are ammonical, yielding ammonia; benzoic, yielding benzoic acid; amylic, yielding amylic alcohol; viscous, yielding a gummy mass; lactic, yielding lactic acid, and butyric, yielding butyric acid. The various kinds of fermentation may be effected at different degrees of temperature, varying from about 24° to 104° Fahr. In digestion the ferments of the pancreas act on fibrin at 90°. Viscous fermentation, in which wine is made thick and viscous so it forms threads when poured, occurs at a temperature of from 60° to 104°. Alcoholic fermentation under certain conditions takes place readily at 24° to 30°. The ferments employed to excite fermentation are mostly organic, though there are many of an inorganic nature. Among the most common fermented liquors containing alcohol and used as beverages are wine, made from the juice of grapes; mead, from honey; cider, from apples; ale or beer, from an infusion of malt; and chica, from maize. The latter is made largely in South America. See Beer.

FERNS, a class of leafy but flowerless plants, springing from a rhizome, which creeps on the surface of the ground, or rises in the air like the trunk of a tree. This trunk does not taper, but is of equal diameter at both ends. The reproductive organs consist of spore-cases and are attached to

FERN-TREE. *a*, spore-cases.

the veins at the under surface of the leaves, or at their margins. Most ferns are comparatively small, while some tree-ferns reach sixty feet in height. Seventy-five genera and about 3,000 species are known. Some ferns yield products useful for food, while other varieties contain properties valuable as medicine for expelling tapeworms. The fronds of ferns, or their impressions, are frequently met with in a good state of preservation as early as the middle of the Silurian period.

FERRARA (fĕr-rä'rä), a city in Italy, capital of a province of the same name, situated on the Po River, about twenty-six miles northeast of Bologna. It enjoyed much commercial prosperity in the 16th century, when it was held by the house of Este as a papal fief, containing then a population of 100,000. Among the most beautiful of ancient buildings are the old ducal palace and several cathedrals. There are several monuments of master artists in the public places, one being dedicated to Savonarola, who was born there. The public library contains 100,000 volumes. There are excellent municipal facilities, while railroad and telephone connections are well established. Among the manufactures are pottery, clothing, utensils, and machinery.



FERRET.

Population of the city, 30,500; of the province, 231,972.

FERRET (fĕr'rĕt), a carnivorous animal of the weasel family, but closely allied to

the pole-cat. In form and size it approaches the common mink. It is native to Africa and cannot endure excessive cold. The representative species are about fourteen inches long and of a yellowish color. Ferrets are much used, both in the United States and Europe, for destroying rats and for driving rabbits out of their places of seclusion. Several species are carefully bred in captivity, in which state they subsist on bread, raw meat, and milk.

FERRIS, George Washington Gale, engineer, born in Galesburg, Illinois, in 1858; died in 1896. He was taken to California by his parents at an early age. Where he received his elementary education, and in 1881 graduated at Troy, New York, from the Rensselaer Polytechnic Institute. Shortly after he located in business at Pittsburg, Penn., engaged in extensive construction work, and, when a special structure was desired for the Columbian Exposition that should rival and excel the Eiffel Tower, he began to prepare the necessary specifications. This resulted in plans for the celebrated Ferris wheel, which attracted universal admiration at Chicago in 1893, and was a source of much profit to the promulgators of the enterprise.

FERRIS WHEEL, an immense structure designed and invented by G. W. G. Ferris, and constructed in Chicago in 1893 as a popular feature in the midway plaisance at the Columbian Exposition. This great wheel, the largest ever built, contained two wheels of the same size that were securely connected by struts and rods. An axle thirty-one inches in diameter and forty-five feet long was at the center, while the spokes were iron rods two and a half inches in diameter, placed in pairs thirteen feet apart at the crown connection. Thirty-six cars were hung on the periphery, each having a convenient seating capacity for forty passengers. The weight of the wheel and passengers was 1,200 tons, this immense burden being supported by substantial mechanical devices and a solid concrete foundation. The circumference of the wheel was 825 feet; diameter 250 feet, and elevation above the ground fifteen feet, making a total height of 265 feet. It was lighted throughout the exposition season by 3,000 electric lights. Its total cost of construction aggregated $300,000, while the number of passengers carried during the period of operation was 1,454,013. It was taken down at the close of the exposition and erected near Lincoln Park, Chicago, and in 1904 was removed to the exposition in St. Louis.

FERRY, a passage by boat across a small body or stream of water. Ferry boats ply back and forth across water to carry passengers, horses, vehicles, or any other form of traffic. Any mode of power may be used to propel the boat, which is usually fastened to a cable stretched from bank to bank. Sometimes a pulley is placed over the cable and the action of the water in a running stream carries it across.

FERRY, Jules Francois Camille, statesman, born in Saint-Die, France, April 5, 1832; died March 7, 1893. He was admitted to the Paris bar in 1854, and soon afterward identified himself with the opponents of the empire. In 1865 he secured an election to the legislature, opposed the war with Prussia in that body, and assisted in suppressing the Commune in 1870. After the establishment of the republic, he became minister to Athens and in 1879 minister of public instruction. When the ministry dissolved in 1880, it devolved upon him to form a cabinet, which soon after adopted a policy of colonial expansion, but resigned in 1881 as a result of dissensions regarding the military contentions in Tunis. In 1883 he was again made premier, but his ministry was overthrown in 1884 by an adverse vote in relation to the war with China. The defeat of the French troops in Tonquin made him unpopular, and he withdrew into retirement until 1893, when he was recalled to public life on account of the Panama Canal excitement. His death occurred shortly after his election to the presidency of the senate.

FESSENDEN (fĕs'ĕn-dĕn), **William Pitt,** statesman, born in Boscawen, New Hampshire, Oct. 16, 1806; died at Portland, Maine, Sept. 8, 1869. After securing a law education, he entered the practice in Maine and in 1832 was elected as a whig to the legislature, where he served a number of terms. The free-soil democrats and whigs elected him to the United States senate in 1854, serving in that body two terms. He became a prominent factor in organizing the republican party, opposed the Kansas-Nebraska bill, and attended the peace convention in 1861. In 1864 he succeeded Salmon P. Chase as secretary of the treasury, which he resigned the following year to again enter the senate. During his last term he was chairman of the joint committee on reconstruction and of the finance committee. Fessenden opposed the impeachment of Andrew Johnson, and was one of the seven republican senators who voted against conviction after the trial by the senate.

FESTIVALS (fĕs'tĭ-vălz), or **Feasts,** a period of one or more days consecrated to commemorate some important event or the observance of some religious rite. Festivals were held by most ancient nations, and have continued through modern centuries, though in a modified form. At the time Homer wrote the "Iliad" it was customary among the Greeks to keep two principal festivals—those of the harvest and the vintage—in which the deities were borne through the assemblages, animals were sacrificed, and the sounds of music rent the air. The six sacred festivals of the Jews are enumerated in Leviticus xxiii. The ancient Greeks celebrated the festivals of Dionysia and Eleusiania, and the Pythian, Olympic,

Nemean, and Isthmian, the four latter constituting their great national games. There were many festivals in ancient Rome, but the Cerealia, Lupercalia, and Saturnalia constituted the more important. Many of the civil festivals of the Romans and Greeks were similar in that they partook of warlike games and exercises.

The festivals kept by the Christians are more or less taken from those of the ancients, but give distinct reference to Christ and other personages held important in the history of the church. The observance of Sunday is of most frequent occurrence. Other festivals designated in the Christian calendar include Christmas, Circumcision, Easter, Corpus Christi, Epiphany, Transfiguration, and Trinity. There are also numerous festivals set apart to commemorate saints, apostles, and angels, though in most of the churches every day of the year is dedicated to some personage or event. Among the festivals set apart by the people of the United States are Lincoln's Birthday, Washington's Birthday, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, New Year's Day, and several others.

FESTUS, Porcius, the Roman governor of Judæa under Nero in 61-62 A. D., who succeeded Felix. The apostle Paul appeared before him as a prisoner, and, after hearing his remarkable plea, Festus manifested a disposition to set him free, but Paul appealed to Cæsar and was accordingly sent to Rome.

FETICH (fē'tĭsh), or **Fetish,** a word introduced by Charles de Brosses (1709-77) in 1760 in his publication, "Du Culte des Dieux Fetiches." It was derived from the Portuguese word feitico, meaning magic, a term that expresses the idea held by the Portuguese concerning the religion of the natives found in Western Africa. The name was applied by Comte in a general way to the primitive theories of religion, but Sir John Lubbock assigns it as the second stage in the evolution of religious thought, rather than as a form of religion. He takes this view for the reason that the idea of worship is not necessarily involved, since the Negro believes that his deities can be compelled to comply with his desires by means of his fetich. Fetichism is a form of superstition that supposes earth, feathers, trees, mountains, plants, serpents, or other animate or inanimate objects to have a spirit, and that the person having possession of the object can utilize that spirit as a servant. If the spirit does not attend to all the possessor requests he beats the object as if to inflict pain as punishment. The most extensive forms of fetich worship prevail in Guinea and other portions of Western Africa.

FEUDAL SYSTEM (fū'dȧl), an economic system or condition in force throughout Europe for many centuries. Under it political and social rank were based on the tenure of feuds and fiefs, given as compensation for military services rendered by chiefs, and under them sublet by allotment to their subordinates and vassals in consideration of like services to be rendered. According to the feudal system the king was the owner of all the land in his dominion, while noblemen held certain tracts under grants from him at his pleasure, but usually on condition of military service. When the Teutonic conquerors of the Roman Empire acquired paramount power, the feudal system made it possible for them to hold possession under the influence of noblemen, who were personally benefited. It had spread over all of France and Germany by the time William the Conqueror led his expedition into Britain, and soon after all the land was seized and a feudal system established. It prevailed in England in a widespread form until the restoration of Charles II., and exists there at present, though under conditions greatly modified. The people of England, who had acquired absolute possession under the Angles and Saxons, universally opposed the establishment of feudal ownership, and the lands held by them were said to be allodial. The spread of civilization and education, a wider knowledge of the rights of citizens, the rise of cities and a change in the modes of warfare contributed largely to the overthrow of the feudal system, though traces more or less prominent are found in various countries, such as land-owners holding title only as tenants from lords or titled nobles. On the banks of the Rhine and in many regions of Germanic and Romantic countries traces of the system remain in castles formerly occupied by feudal barons, and numerous villages in which dependents were grouped for religious worship and educational instruction.

FEUERBACH (foi'er-bäĸ), **Paul Johann Anselm,** distinguished criminal jurist, born in Jena, Germany, Nov. 13, 1775; died May 25, 1833. He graduated from the law course of the University of Jena, became devoted to the practice of law, and later accepted the chair of jurisprudence at Jena and subsequently at Kiel. In 1804 he was made professor of criminal law in the University of Landshut, and soon after drew a criminal code for Bavaria. He became second president of the court of appeals at Bamburg in 1814, and three years later was made first president of the appeal court at Anspach. Among his publications are "On the Crime of High Treason;" "Remarkable Criminal Trials," and "Contributions to the Art of Law Making."

FEUERBACH, Ludwig Andreas, philosopher, son of the preceding, born in Landshut, Germany, July 28, 1804; died Sept. 13, 1872. He studied at Heidelberg, and later at Berlin under Hegel. In 1828 he secured a professorship in the University of Erlangen, but after a few years devoted all his time to literary work. His teachings contend against immorality, and hold that truth can be ascertained only by the senses

coming in touch with things. Among his best known works are "Essence of Religion;" "Thoughts Regarding Life and Death;" "Godhead, Freedom, and Immortality," and "Essence of Christianity." The latter was translated by George Eliot in 1854.

FEVER, a disease or group of diseases characterized by an accelerated pulse and increased heat of the skin. Fevers usually commence with chills, loss of appetite, feeling of lassitude, pains in the back and limbs, and nausea. They are classified into continued fevers, such as typhus or typhoid; intermittent, occurring at regular periods; remittent, such as yellow fever; and eruptive fevers, as smallpox, measles, and scarlet fever.

FEZ, the largest city in Morocco, capital of the province of Fez and principal seat of government in Morocco. It is situated in a valley of the Atlas Mountains, about one hundred miles east of the Atlantic, and eighty-five south of the Mediterranean. The valley is fertile, and through it flows the Fez River, on which the city is located. Ancient walls surround the city, which is made up largely of inconvenient houses, has angular streets, and extremely poor sanitary regulations. There are numerous mosques, one of which is the largest in northern Africa. The palace of the sultan is an ancient structure, but it is in a state of good preservation. Many of the edifices have fine porticos, and are beautified by trees and gardens. There are numerous parks and some municipal facilities, such as telephones, sewerage, and tramways. The commercial importance of Fez dates from times far remote, though domestic commerce is carried on largely by caravans from and to the interior. The trade with Europe is extensive, the exports consisting largely of the interior products and manufactures. Among the manufactured products are leather, silk, woolen cloaks, fez caps, handkerchiefs, pottery, and utensils. The university, founded in 1859, constitutes one of the largest in northern Africa, and gives evidence of its importance as a seat of Arabian learning. There are fifty professors, about 800 students, and a large library, botanical gardens, scientific supplies, and general apparatus. The city was founded in 793. It was the capital of an independent state from 1202 to 1548, during which period it attained widespread prosperity, and was long famous as a seat of Arabian learning. The inhabitants consist mostly of Arabs, Jews, Berbers, and Negroes. Population, 140,500.

FEZZAN (fĕz-zän'), a state in northern Africa, situated south of Tripoli and attached to it for governmental purposes. Its length from east to west is 380 miles; width, 300 miles, and area 110,000 square miles The surface forms a vast depression, dotted with many small oases and surrounded by mountain chains. It is largely unproductive, owing to an excessively hot climate and the absence of sufficient rainfall. The domestic animals consist largely of goats, sheep, camels, and cattle. Among the chief agricultural products are cotton, barley, wheat, millet, tobacco, vegetables, and fruits. The government is administered by a lieutenant-governor under the pashalic of Tripoli, and constitutes a dependency of Turkey. Murzuk is the principal town, having a population of 7,250. The population, including Arabs, Berbers, and Negroes, is estimated at 50,000. There has been little advancement in the industries and arts, many of the people being unable to read and write. Arabic is the chief language and Mohammedan the prevailing religion.

FIBER (fī'bĕr), a small thread, string, or filament of which the tissues of animals and plants are constituted. Asbestos is the only mineral fiber known. The utility of fibers in the arts and manufactures depends upon the length, structure, strength, and ability to retain colors in dyeing. Among the more common animal fibers in use are wool, silk, and furs (q. v.). Vegetable fibers are also extensively employed, and are obtained from different parts of a large number of useful plants. Cotton fibers surround the seed of the cotton plant; jute, hemp, and flax fibers are obtained from the bark of plants. The husk of the cocoanut and the leaves of various palms are used for making ropes and matting. In recent years the fiber of the sisal hemp has come extensively into use for binding-twine and ropes. See **Cotton, Linen, Paper.**

FIBRIN (fī'brĭn), a white proteid compound obtained when blood is coagulated, as by stirring fresh blood with a bundle of twigs. The fibrin, adhering in fibrous layers, is washed with water to remove the coloring matter. It is insoluble in water, but dissolves in an aqueous solution of nitrate of potassium, when heated to 40° Fahr. Normal human blood contains 2.55 per cent. of fibrin. Vegetable fibrin is a nitrogenous substance resembling animal fibrin, and is separated from cereal-grains and other seeds.

FICHTE (fik'tẹh), **Johann Gottlieb**, celebrated philosopher, born in Rammenau, Germany, May 19, 1762; died in Berlin, Jan. 27, 1814. He descended from a family noted for piety and solidity of character. By mere accident Baron Miltitz noted his remarkable mental vigor and placed him in charge of Pastor Krebel at Niederau, where he was prepared for higher instruction. He entered the University of Jena as a student of theology, and later took a course in philosophy. In 1790 he settled in Leipsic, where he married Johanna Maria Rahn, and the following year met Kant, which proved the most important event of his life. He soon attracted the attention of the latter and won his affections. Subsequently he was elected to the chair of philosophy at Jena, later at Erlangen, and still later became

rector of the University at Berlin. Under an appointment of the king, he prepared a constitution for the latter institution, and in the line of duty became associated with such men as Schleiermacher, Humboldt, De Welte, Neander, and Schlegel. The latter part of his life was devoted largely to lectures, and, when the vast movements for German national independence became spontaneous, he contributed support by fervid addresses. His work led to no distinct school, but his teachings and writings have influenced the educational aspect of all civilized peoples. Among his celebrated works are "Critique of Revelation;" "Nature of the Scholar;" "Vocation of Man;" "Way to a Blessed Life;" "Characteristics of the Present Age;" "Vocation of the Scholar;" "Our Belief in a Divine Government of the Universe," and "Introduction to the Theory of Science." Thomas Carlyle and a number of other writers translated from Fichte. Several of his works on education are considered excellent authority, and are quoted frequently by educators.

FIELD, Cyrus West, merchant and scientist, born in Stockbridge, Mass., Nov. 30, 1819; died in New York City, July 12, 1892. After receiving an education in the public schools, he went to New York City, where he secured a position as clerk in a dry goods store at a small salary. In 1840 he established himself as a paper manufacturer. He retired from business in 1853, traveled in South America, and, on his return the following year, began to study oceanic telegraphs. After numerous unsuccessful attempts, he finally succeeded in securing a charter for a telegraph line from New York City to Europe by way of Newfoundland. He devoted thirteen years to this enterprise, in enlisting interest and having the work done, and in the meantime crossed the Atlantic fifty times. The line to Newfoundland was first completed, receiving his personal supervision, and in 1857-58 he accompanied the expedition to lay the cable in the Atlantic Ocean from Newfoundland to Europe. The enterprise was finally completed in 1866. Congress voted him a gold medal for his achievement, and he also received various decorations from several European countries. Since the completion of the line communication between the two continents has never been interrupted, though much difficulty was experienced at first. Later he promoted the construction of the elevated railroads in New York City, and erected a monument to the memory of Major John Andre at Tarrytown, New York, but the latter was subsequently destroyed by people prejudiced against Major Andre. His faithful life-work was recognized by the civilized world, but financial embarrassments embittered his closing years.

FIELD, Eugene, journalist and poet, born in St. Louis, Missouri, Sept. 3, 1850; died in Chicago, Nov. 4, 1895. He entered Williams College in 1868, and later attended Knox College, Galesburg, Illinois. His higher education was secured at the State University of Missouri, and, after traveling abroad, he engaged in newspaper work in 1873 with the "St. Louis Journal." Later he held editorial positions on papers published at St. Joseph, St. Louis, Kansas City, Denver, and Chicago. In connection with the "Chicago Morning News," now the "Record-Herald," appeared his best journalistic work, in a column called "Sharps and Flats." As a platform reader of his own productions he stood in high repute, and while preparing for a trip of this kind he died quite suddenly. Field, as a joker, was practical, bold, and always showed a spirit of enjoyment that made him universally popular. Among his productions for children are "Little Boy Blue;" "Seein' Things;" "Jes' 'Fore Christmas," and "Wynken, Blynken and Nod." These have caused him to be styled "Poet Laureate of the Children." His best known published works include "Second Book of Verse;" "Love Songs of Childhood;" "Echoes from the Sabine Farm;" "Little Book of Western Verse;" "Gradual Rise of Literature in Chicago," and "Book of Profitable Tales."

EUGENE FIELD.

FIELD, Stephen Johnson, celebrated jurist, born in Haddom, Conn., Nov. 4, 1816; died in Washington, D. C., April 9, 1899. He was the brother of Cyrus West Field, secured a primary education at Stockbridge, Mass., and at the age of thirteen accompanied his sister on missionary work to Greece and Smyrna, where he remained three years and secured many advantages in learning Greek and other languages. On returning to the United States he studied at Williams College, from which he graduated in 1837, and engaged in the practice of law in New York City. In 1848 he traveled in Europe, and the following year settled in Marysville, California. He was elected to the legislature the same year, in 1857 to the supreme court of California, and in 1863 was appointed by President Lincoln to the supreme bench of the United States, though belonging to the democratic party. In 1869 he was chosen professor of law in the University of California, and in 1873 the governor appointed him to codify and suggest amendments to the state laws. He was a member of the electoral commission in 1876, and voted with the democratic minority. The national democratic convention held in Cincinnati, in 1880, cast sixty-five votes for him as a candi-

date for the presidential nomination. Justice Field served longer than any other supreme court justice, the total time of service being thirty-four years and six months. According to a statement made by himself, he wrote fifty-seven opinions in the circuit court, 365 in the supreme court of California, and 620 in the federal supreme court, making a total of 1,042. He was an opponent of encroachments by corporations, a friend of personal liberty, and stood fearless in his opinions irrespective of policy or pressure.

FIELD GLASS, a small binocular, portable, terrestrial telescope for determining the exact distance of an object from the observer. It is used largely in armies to ascertain the distance of the enemy, and to range the guns on the basis of observations made by means of it. An achromatic telescope, having from three to eight joints, being from fifteen to thirty inches long, is also designated by the same name.

FIELDING, Henry, celebrated novelist, born in Sharpham Park, England, April 22, 1707; died in Lisbon, Portugal, Oct. 8, 1754.

FIG. *a*, leaves and fruit; *b*, section of fruit; *c*, flower.

He was the son of Gen. Edmund Fielding, secured an education at Eton and Leyden University, and turned his attention to the stage. The first dramatic production from his pen is entitled "Love in Several Masks," written in 1728, and was received with favor. Shortly after he became the manager of a theater, studied law, and edited several periodicals. He married Miss Craddock in 1737, by whom he came to be the possessor of some means, and the death of his mother occurring about the same time also brought a small estate in Dorsetshire into his possession. Among the chief merits of Fielding as a writer are his well applied humor, witty pleasantry, and correct knowledge of character. Among his principal writings are "Joseph Andrews;" "History of Tom Jones;" "Journey from This World to the Next;" "Don Quixote in England;" "Modern Husband;" "Journal of a Voyage to Lisbon;" "Temple Beau," and "History of Jonathan Wild."

FIFE, a small, shrill-toned, martial instrument, either of wood or metal, in the form of a tube, having finger-holes and a blow-hole or mouth-piece. Fifes and drums have been a source of much inspiration in the army during long marches and are still held in high esteem.

FIG, a small fruit tree native to Asia Minor, but now cultivated in all the countries adjacent to the Mediterranean. There are about 300 known species, most of which are characterized by large leaves. The average height of the fig tree is about twenty feet. In favorable climates it produces two crops of figs yearly, in the spring and autumn. The fruit is a fleshy receptacle of a conical form, attached by the narrow end. At the larger end is a small opening as in a pear, the flower and seeds lining the interior. The fig is used as food, and in medicine as a demulcent and laxative. Dried figs form an important article of commerce, the best grade being imported from Turkey and the Levant.

FIJI ISLANDS (fē'jē), an island group in the South Pacific Ocean, consisting of about 250 distinct islands, of which one-third are inhabited. They are situated 7,450 miles from San Francisco, contain an area of 8,050 square miles and a population of 125,000, of whom 99,275 are natives. The two largest are Vanua-levu and Viti-levu, the former having an area of 2,600 square miles, and the latter 4,250 square miles. Abel J. Tasman (1600-59), a Dutch navigator, discovered them in 1643, and Captain Cook cruised among them in 1773. An influx of European settlers began in 1866, principally from Australia and New Zealand, and soon after the commercial interests of the Fijis grew to importance. Since 1874 they have been formally governed by Great Britain as the Fiji Colony. The climate is healthful, the soil productive, and the natives have become largely educated and Christianized. Among the principal products are live-stock, maize, cotton, copra, sugar, peanuts, tobacco, pearl shells, and fruits. The government maintains two public schools and an industrial institute, at which about 200 pupils attend. The Wesleyan missionaries direct almost entirely the educational affairs, their schools numbering 2,075, at which 35,500 pupils attend. Besides these, there are 145 schools of the Roman Catholic mission, at which 2,150 pupils are enrolled. Perhaps these islands present one of the most favorable examples of effective Christianizing, fully 110,000 of the inhabitants being Christians, while not more than seventy-five years ago the natives ranked as the fiercest of cannibals. The island group is of volcanic formation, though it contains numerous coral reefs and atolls, while volcanic and earthquake actions are not infrequent.

FILE, a steel instrument for abrading or smoothing surfaces, having raised cutting surfaces or teeth made by indentations of a chisel. Files are of various shapes, sizes, and fineness of cut. They are either single-cut, having but one row of teeth, or double-cut, having two sets of teeth crossing obliquely. A rasp is a similar instrument, but has coarser teeth and is used on soft materials, such as wood and the hoofs of horses. The file is one of the most ancient instruments, and is mentioned as early as 109 B. C. Only high grade steel is used in manufacturing files. The cutting and tempering involve much skill and the use of complicated machinery.

FILIBUSTER (fĭl-ĭ-bŭs'tĕr), a name applied originally to West Indian pirates. The word is of Spanish origin, in which language it designates a fast-sailing vessel or fly-boat. It came to be the designation of the adventurers who organized expeditions in the United States to gain control of West Indian and Central American regions with the hope of having them annexed to the United States, and thus to extend the slave territory. Gen. William Walker, who was captured, court-martialed, and shot Sept. 12, 1860, was the most noted of the filibusters. The term filibuster has been introduced recently to designate the members of the minority of a legislative body, who seek to delay or defeat the adoption of measures obnoxious to them by raising questions of parliamentary law, making motions to adjourn, or calls for yeas and nays.

FILLMORE (fĭl'mōr), **Millard**, thirteenth president of the United States, born in Summer Hill, New York, Feb. 7, 1800; died in Buffalo, March 8, 1874. He descended from a family distinguished in the French and Revolutionary wars, worked with his father on the farm, and in 1815 was apprenticed for a few months to a carder and cloth dresser. Shortly after he taught school; in 1823 was admitted as an attorney to the court of common pleas in Erie county, and in 1830 began a successful law practice at Buffalo, New York. His political career began and ended with the birth and extinction of the whig party. In 1828 he was chosen to the legislature, where he served three terms, and in 1832 was elected to congress, securing re-elections in 1836, 1838, and 1840. He failed in obtaining the nomination for vice-president in the whig convention at Baltimore in 1844, but was nominated for governor of New York and defeated by Silas Wright. The whigs nominated him for vice-president in 1848 on the ticket with Taylor, and he became president on July 10, 1850, at the death of the president. An effort to nominate him for president in 1852 failed; General Scott defeating him in the convention. He made an extended visit to European countries in 1856, and while at Rome was nominated for president by the American party, but received only the electoral vote of Maryland. His home was at Buffalo after retiring from the presidency, where he established the Buffalo Historical Society and frequently presided over conventions and public meetings. The important event in his time of service in the legislature of New York, in 1829-31, was the abolition of imprisonment for debt under a bill written by him. During his presidency the country was prosperous and at peace. The passage of the Omnibus Bill was the most noted event of his administration.

MILLARD FILLMORE.

FILTRATION (fĭl-trā'shŭn), a process by which solid particles are separated from a liquid by causing the latter to pass through porous substances, which retain the solid particles or impurities. In constructing a filter it is necessary to use materials that contain interstices or pores through which the liquid may pass, but they must be sufficiently fine to retain the solid particles. Ordinary plans for filtering may be illustrated in a device utilized in constructing cisterns, in which the water is passed through a porous substance, such as sandstone, brick charcoal, silicated carbon, wood, gravel, powdered glass, or others by which the solid particles may be retained. The most serviceable plan is to conduct the water through a pipe to the filter, which is commonly made of various layers, such as sand, gravel, charcoal and other substances alternated, and, after passing through them, it is dropped into the cistern or tank beneath. A partition wall of brick, through which the water passes, is not an uncommon form, the water being dropped in on one side of the wall and drawn out for use at the other side.

In order to preserve a good sanitary condition it is necessary to have the filter constructed in such a way that it may be removed and cleansed or replaced by other substances at least once or twice a year, otherwise the pores become clogged, or the mass solidifies by the particles retained, and thereby it becomes inoperative or impure. In filtering oils, syrups, ale, beer, and other similar substances it is customary to use horse-hair, cloth, felt, skins, cane, clay, wool, capillary threads, etc., this depending upon the character of the liquid to be purified. Charcoal made of bones is much more serviceable than that secured by burning wood, and is utilized to reduce the color of alcoholic beverages and to whiten sugar. Mechanical devices are now used extensively to clean water in tanks and cisterns. They are placed in the water and, by

manipulating a valve, the entire body is forced through a small filtering cylinder, by means of which the particles become separated and are thrown out. However, it must be borne in mind that filtration removes only substances suspended mechanically in the liquid, while impurities or foreign substances existing in a dissolved state can be removed only by distillation. See Distillation.

FINCH, the popular name of various small birds, many of them having fine plumage and a beautiful song. They are usually called hard-billed song birds to distinguish them from the warblers or soft-billed songsters. Various species of the finches inhabit nearly all parts of the globe. They are variously known as bull-finch, chaf-finch, haw-finch, and pine-finch. These birds may be distinguished by their strongly formed bill, suitable for crushing seed, which is their favorite food.

FINDLAY (fĭnd'lā), a city in Ohio, county seat of Hancock county, on the Blanchard River, about forty-two miles south of Toledo. The discovery of extensive deposits of natural gas in 1885 gave the city an impetus, and led to the opening of many productive wells. Soon after many factories were located in the city, which induced the building of extensive municipal improvements, and led to the development of a considerable trade. Among the manufactured products are vehicles, machinery, ironware, earthenware, clothing, glass, baskets, flour, pottery, and stoves. Numerous railroads and electric car and telephone lines connect the city with other business centers. Among the substantial buildings are the courthouse, numerous public schools and churches, and many fine residences. The city has waterworks, pavements, sewerage, and a public park. Population, 1900, 17,613.

FINGAL'S CAVE (fĭng'gals kāv), a celebrated natural cavern on the island of Staffa, off the western shore of Scotland. The basaltic columns consist of immense dikes with diversified though symmetrical forms, and are joined with much beauty. Its breadth at the entrance is forty-two feet, at the end twenty-two feet, and the length is 227 feet. The height of the arched roof is sixty-five feet. The cave can be entered by small boats, since the low-water-mark in the cave is about twenty feet. This cavern presents one of the most picturesque of the many non-volcanic igneous eruptions found in the earth's crust.

FINLAND (fĭn'land), a province of Russia, containing an area of 144,550 square miles. It is bounded on the north by Norway; east by the governments of Archangel and Olonetz; south by the Gulf of Finland, and west by Sweden and the Gulf of Bothnia. The Finns are allied to the Magyars of Hungary and the Laplanders, and differ in language and habits from the Russians and Swedes. The language is classed with the northern division of the Turanian or Uralo-Altaic family, which is spoken by the people of Lapland, Olonetz, and Archangel. Their literature is valuable on account of the richness and beauty of its poetry, and the language is not only agreeable, but has a wealth of vowels and diphthongs, and is uncommonly flexible. Within recent years several lexicons and treatises on their history, language, and literature have been published, while their tongue is taught in many of the higher educational institutions.

The Finns had independent chiefs up to the 12th century, and were a warlike people. They were conquered by the Swedes about 1150, and their conversion to Christianity followed soon after. Peter the Great of Russia secured a portion of their territory by treaty in 1721, and Russia conquered the remainder from the Swedes in 1809. The established religion is Lutheran, and is the faith of practically the entire population; only 45,500 belong to the Greek Church. Religious, civil, and commercial freedom was retained by the Finns until 1899, when Finland was made a Russian province, and a plan to Russianize the people was inaugurated—a policy much the same as that pursued in Ireland by the English. Up to that time the military forces were trained and maintained for the benefit of the local duchy, but the nationalizing policy inaugurated included that the Russian system of finance, education, and military practice be substituted for those of the Finns. Finland contains many lakes and numerous marshes, the largest of the lakes being Kemi, Enara, Ulea, Saima, Payanne, and Ladoga. Many of these lakes are connected by excellent canals, whereby commercial enterprise has been greatly facilitated, while the railroads are under government control and furnish connection with all the important commercial centers. The rivers are unimportant, and no great mountain elevations exist. There are vast forests, covering about half of the land surface, though coal and extensive fossils do not abound. Among the chief agricultural products are wheat, oats, rye, and barley. The climate is affected by the adjacent water surface, rendering it suitable for the production of pears, apples, cherries, and small fruits, though the larger thrive only in the southern portions. Many of the lakes and streams abound with salmon, trout, perch, pike, and other food fish. All the domestic animals common to Europe are produced with profit, especially cattle, horses, sheep, and swine. The state of education, like that of the Scandinavian countries, is on a high plane of efficiency, and greatly excels that of any other portion of Russia. Nearly the entire population is able to read and write, the result of compulsory attendance laws and a free school system for both sexes. Helsingfors is the principal city and the seat of literary life and impulse. A university supported by government grants is maintained, at which 2,150 students attend.

Higher courses of study are included with the curriculum, and excellent apparatus and a library have been provided. The principal exports consist of furniture, textile fabrics, chemicals, cereals, meat, fish, paper, iron, and leather. Population, 2,750,000.

FINLAND, Gulf of, an extensive arm of the Baltic Sea, extending to the east between Finland on the north and the Russian governments of St. Petersburg and Esthonia on the south. The width is from ten to seventy-five miles and the length 250 miles. It receives the outflow from Lakes Ladoga and Onega. There are numerous islands, sandbanks, and shoals. The Russian government maintains several forts on the gulf, and there are many fine harbors. The shores are rocky and precipitous and the waters only slightly salty.

FINNEY (fĭn'ĭ), **Charles Grandison,** celebrated clergyman, born in Warren, Conn., Aug. 29, 1792; died in Oberlin, Ohio, Aug. 16, 1875. Being licensed to preach in 1824, he soon entered upon evangelistic work and attained marked success in Troy, Utica, Boston, Philadelphia, and New York. In 1835 he became professor of theology at Oberlin College, and was its president in 1851-66. Later he labored in Europe as a revivalist for three years. Among his publications are "Sermons on Important Subjects;" "Lectures on Revivals of Religion;" "Sermons on Gospel Themes," and "Lectures to Professing Christians."

FINS, the organs of fish which serve to propel, balance, or steer them in the water. They usually consist of rays of bones cov-

FISH, SHOWING FINS.

ered with an elastic membrane. The pectoral or breast fins, just behind the gills, are modifications of the anterior limbs in other vertebrate animals, and the ventral or belly fins correspond to the hind limbs. There are from one to four dorsal or back fins, two anal fins near the anus, while the tail is known as the caudal fin. The term fin is often applied to the paddles of a whale, but never to the hind feet of seals or the webbed feet of birds.

FIR, a name once used co-extensively with the widest sense of the word pine, but now restricted by botanists to the one genus abies, including spruce fir, silver fir, Norway spruce, and other species. The genus abies is distinguished from the pines by the flat, rounded apex of the scales of its cones, and by leaves not in clusters of definite number. Fir trees are found in many parts of Eurasia and America, and their products form a considerable article of commerce. From the Norway spruce is obtained lampblack, tar, turpentine, resin, and Burgundy pitch. The bark is used in tanning and for making baskets, the roots for cordage, and the wood for fuel, house-building, and for masts and spars of ships. In the market the wood of

BALSAM FIR.

the Norway spruce is known as Christiania deal and Dantzic deal. Hemlock forms dense forests in the northern part of the United States and Canada, extending as far as Hudson Bay. The bark is valued for tanning, while the wood is a poor grade of lumber. In the northwestern part of North America is found the Douglas fir, often growing 250 feet high. Spruce beer is made from small branches of the black spruce, and Canada balsam from the balm of Gilead fir.

FIRE, the evolved heat and light produced by ignition or combustion. The vividly perceptible ascending stream or current exhibited in the combustion of gases is called flame. In ancient times it was regarded one of the four primary elements of which all things were thought to be composed, the other three being earth, air, and water. Among the ancients and even within comparatively recent times many superstitions regarding fire were common, such as led to fervid and devoted fire-worship. Many uses of fire were known very early, though some of the common methods of producing and controlling it are quite recent. The newer methods include its production by inflammable matches and its extinction by chemical compounds, as by a mixture of dried ferro-cyanide of potassium, chlorate of potassa, and sugar set in action by sulphuric acid, or by mechanical agencies.

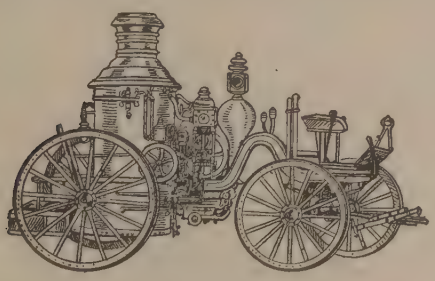
FIRE-ALARM, an apparatus for communicating warning of a fire, either electrical or mechanical. An automatic arrangement is now in use which depends for its action upon the increased temperature of the air in the vicinity of the fire, or of the burning away of certain connecting cords which

are stretched in exposed situations. In large cities there are stations where any person discovering a fire may turn in an alarm by touching an electric button, which immediately gives the street and number of the house on fire, at the central station, whence relief may be speedily despatched.

FIRE-CLAY, a variety of clay found in a stratum below coal formations and sometimes elsewhere, and used in the manufacture of brick, tile, gas-retorts, and other vessels suitable to withstand high temperatures. The principal constituents of fire-clay are silica and alumina, accompanied by small portions of iron, lime, magnesia, water, and organic matter. Fire-clay is found extensively in the United States and occurs in all the continents.

FIRE-DAMP, an explosive gas generated in coal mines, consisting chiefly of light carburetted hydrogen. When fire-damp is mixed with from four to twelve times its volume of atmospheric air, it is explosive; but when the proportion is above or below these limits, it is inflammable, burning quietly with a pale-blue flame. It is very dangerous to miners, the principal protection being the safety lamp, though in most cases danger can be avoided by a good system of ventilation. Edison invented an electrical safety lamp that gives a strong light for several hours at a very trivial expense and, when any accident occurs to break the globe, the light instantly becomes extinguished.

FIRE ENGINE, a machine designed to throw water for the purpose of extinguishing fires. Mechanical devices for the purpose of



FIRE ENGINE.

saving buildings and cities from destruction by fire were used more or less for many centuries, though it is only within recent years that they have been brought to a high state of efficiency. They are mentioned in Roman history by Pliny, and appear to have formed a part of the municipal facilities of Athens, Carthage, and Alexandria. Several mechanical devices for throwing water to considerable heights were used extensively in Europe in the 16th century, the most successful of which were built in Augsburg, Germany, while excellent engines were constructed at Nuremburg in 1657 and at London in 1730. In the United States they came into use about 1731, and at present some form of fire engine is a portion of the necessary equipment for municipal protection, not only in every city, but in all the towns and hamlets.

Fire engines are a class of force pumps by which the water is subjected to a pressure sufficient to raise it to the necessary height, and are now generally worked by steam. In the smaller engines a cistern holds the supply of water, though in the larger a direct connection with the city water supply furnishes the necessary quantity to be rapidly thrown to great heights on burning structures. Steam fire engines have either rotary or piston pumps constructed on a single or double plan, with either tubular flue or coil boilers. The larger weigh about five tons, though engines weighing about three tons are preferred on account of greater facility in moving them hastily to the point of danger. The capacity of these engines is from 200 to 900 gallons per minute, the flow of water being controlled by an automatic relief valve. Fire engines are drawn by horse power, though steam is also employed in the larger cities; the first of this class was put into successful use at New York in 1873. In smaller cities and villages chemical fire engines are used with good results. By these a stream of water from one-fourth to three-fourths of an inch may be thrown 200 feet by means of a chemical mixture with water, which produces carbonic acid gas and supplies the pressure necessary. A hose cart is used in connection with fire engines. It consists of a four-wheeled vehicle, supplied with about 1,000 feet of hose, and is moved along with the fire engine to the place of danger, but in many of the newer chemical engines the hose is carried on the engine itself. The hose is made of cotton fabric, and is lined within and covered without by rubber, though there are several varieties of manufacture.

FIRE ESCAPE, a device for enabling persons to escape from the upper parts of high buildings. Most tall, modern constructions are provided with iron ladders extending from the top of the building to the ground on the outside of the brick or stone work, and put up as the masonry is built. Ladders capable of being drawn out like a telescope are preferred in some classes of buildings. Rope ladders with hooks at one end are a part of the equipment of many of the more important hotels and of some travelers. In many cases large nets of stout sail-cloth or slender ropes are utilized for lowering persons to the ground, or for them to jump into while held from the ground by the firemen. Persons weighing 200 pounds can safely jump one hundred feet into these nets. Some cities are provided with a cannon that shoots a projectile with a cable or rope attached over the building in which the danger occurs, and it is then fastened to form a means of escape.

FIRE EXTINGUISHERS, the chemical agents utilized in extinguishing fires. There

are various compounds, the most common being a mixture of chlorate of potassa, sugar, dried ferro-cyanide of potassium, and water, and, when sulphuric acid is brought in contact with it, gases are liberated and the whole is directed to quench the flame. All rooms in first-class hotels, passenger cars, and passenger compartments in steamboats are supplied with bottles of chemical fire extinguishers, by means of which conflagrations may be averted by prompt action.

FIREFLY, the name commonly applied to all winged luminous insects. They abound in all the warmer latitudes, especially near wet and marshy grounds. Some have a steady glow, but most varieties, as they fly, emit and conceal their light with much regularity at intervals of three or four seconds. In most of these insects the light proceeds from the last three segments of the abdomen. An adult firefly is shown in the

FIREFLY. LARVA. GLOW-WORM.

accompanying figure, together with a larva and a glow-worm (q. v.). In most species of elaters the larva is more or less luminous. The common firefly or lightning-bug is not much over half an inch long, while some varieties found in the West Indies are larger and emit light so powerful that small print may be read by means of it, while a fair light may be secured by confining a number in a glass vessel. Several species native to the West Indies emit light from two eye-like tubercles on the thorax.

FIREWORKS, the common name of preparations containing combustibles and explosives, such as charcoal, niter, and sulphur, with chemicals producing colored lights or scintillations in burning, and used to make displays at festivals, expositions, or at times of public rejoicing. There are many different forms that give various effects, such as crackers, rockets, squibs, Roman candles, torpedoes, balloons, wheels, and other arranged pieces. Many are contrived with ingenuity and skill, and, when ignited, represent various pictures and devices. The powder utilized in fireworks is made according to the same principle as gunpowder, but with it are used charcoal, niter, sulphur, and other substances to influence the explosive properties and give tint or coloring. Filings of zinc impart a bluish color; iron or steel filings increase brightness, while a greenish tint is secured by copper filings. Besides this class, such chemicals as salt, lampblack, amber, and resin are used.

The Chinese and Hindus manufactured fireworks many centuries before they became known to the Europeans, largely for the reason that they knew of gunpowder much earlier than western peoples. They also utilized them at festivals and celebrations. Many of the different devices used in producing noise and illuminations at night are of Chinese manufacture, though within recent years large establishments have been built in the United States at which all classes of fireworks are manufactured. The largest establishment of this character is located in New Jersey. Firecrackers are among the most popular devices used at celebrations. They consist of a tube made of strawboard, are from two to fifteen inches in length, and have a diameter equal to about one-tenth of the length. The newer process of manufacture has made it possible for one person to make about 2,500 tubes per day. These tubes are plugged with pasteboard wad, cord, or pith at one end and at the other with clay or wood pulp, and in the latter a fuse is placed. The explosive is on the interior, and with it the fuse articulates. When finished, the firecrackers are covered with an artistic red paper, dried, and packed ready for the market.

FIRE-PROOFING, a term used to describe the construction of buildings, treatment of portions of buildings, or apparatus by which they become partly or wholly invulnerable to damage by fire. The safeguards adopted early in the history of constructive building consisted of using brick or stone, and later iron entered into doors, lintels, and stairways. These and other methods are now in common use, while in large cities every building must be constructed according to certain specified conditions provided by the city authorities. Wood treated with silicate of soda is made largely proof against fire, since the application of strong heat fuses it into a kind of glass that forms a shield of protection. Cloth or wood does not blaze, if impregnated with certain saline substances, such as phosphate of soda or ammonia, borax, alum, and many other chemicals. Cloth may be treated with graphite in a bath and then placed in an electro-metallic bath apparatus by which the cloth is coated with metal. Woolen and ordinary fabrics are rendered fire-proof by being treated with borax, alum, or soluble glass.

Papers and valuable documents are preserved in fire-proof safes, which are constructed with double walls, having the intervening space filled with a non-conductor of heat. In the tall buildings of cities marked precaution is taken in the construction of all portions exposed to view, but there are also metal shutters to protect the outside windows against the entrance of fire from a neighboring building while burning Be-

sides, water pipes extend from the basement to the upper story, these being connected with pumps below, and there are also water buckets, hand grenades, and mechanical extinguishers for protection against incipient damage by fire. In many structures are stairways and openings by which entrance and passage of firemen to all parts of the building are facilitated. By these and similar means it is possible to protect and guard the larger centers of commerce against widespread fires, such as have destroyed portions of London, New York, Philadelphia, Chicago, and other cities at different times.

FISCHER (fĭsh'ẽr), **Ernst Kuno**, celebrated philosopher, born in Silesia, Germany, July 23, 1824. He studied in Posen, Leipsic, and Halle, graduating at the last named place in 1847. He became a teacher of philosophy at Heidelberg in 1850, but was deprived of the position three years later because the charge that he inclined to pantheism had been preferred against him. In 1856 he secured a chair at Jena, and in 1872 succeeded Zeller at Heidelberg, where he aroused much interest in philosophical research. Among his principal writings are "History of Modern Philosophy;" "Critique of Kant," and "System of Logic and Metaphysics." Several of his works have been widely translated and are used as texts in divers countries.

FISH, a class of vertebrate animals which live in water and breathe by gills, and in no stage of their existence by lungs. Their

SKELETON OF FISH.

form is generally adapted to easy and rapid progression through water, tapering toward the extremities, but exceptions are numerous. The typical character of the skeleton is evidently homologous with those of quadrupeds and man. The four limbs belonging to the usual structure of vertebrate animals assume the forms of fins. Fins, gills, and, most generally, scales are distinguishing features of fish. The heart contains only one auricle and one ventricle, receiving venous blood only, and sending it to the gills, where it is oxygenated and passed by the dorsal vessel into the greater and only circulation. Fish, with few exceptions, are cold-blooded animals; that is, they have a temperature little above that of the water in which they live. When taken from the water, they die in consequence of the drying up of the fine fringes of the gills.

In most fish the gills are situated at the back part of the sides of the head, usually four on each side, and consist of folds of membrane attached to the surface of the gill cavities, or a multitude of vascular membranous plates, generally in double fringe-like rows fixed by the base. The gill-orifices are covered by a bony plate whose motion expels the water, which is taken in by the mouth to supply the gills with air. Fishes possess nerves and organs of all the senses, although the senses of touch and taste are dull compared with those of many other animals. Some fish are destitute of sight, while most varieties have large eyes and a very acute vision. There are various kinds having no teeth, but many species have a large number. The air-bladder, an organ aiding them to maintain an equilibrium in the water, is found in many kinds. Fish spawn or eggs are usually deposited in sand or gravel where the water is shallow. Many species leave the depths of the ocean and pass into fresh water for this purpose. A single codfish is said to lay nine million eggs. Fish, being cold-blooded, need no covering for warmth; hence, the scales serve for protection or as a defensive armor. While the skin of cartilaginous fish yields shagreen and the bladder of some fishes isinglass, by far their most important use consists in supplying man with food.

A variety of species known as deep-sea fish are very peculiar and formerly were not known to exist. Many of them have no eyes, for the reason that sunlight is absent from the depths at which they thrive. Their peculiar structure enables them to withstand the low temperature and enormous pressure that exist at great depths. They live almost, if not entirely, upon animal life, as plants do not grow without the influence of sunlight. Many of the species have extended mouths and dilatable stomachs, which enable them to swallow and digest bodies much larger than themselves, or strain out material from sediment that settles down from above. The fins and tail are long and delicate, because of the perfect calm at such depths. See **Fins**.

FISH, Hamilton, statesman and diplomatist, born in New York City, Aug. 3, 1808; died Sept. 7, 1893. He graduated from Columbia College in 1827, studied law, and in 1830 was admitted to the bar. Subsequently he was elected to congress as a whig, serving in the lower house until 1845. He was lieutenant-governor of New York in 1847-48; in 1849-51 governor of that state, and was elected a member of the United States senate soon after. On retiring from congress, he traveled in Europe several years, and received an appointment as United States minister to France. In 1869 President Grant made him secretary of state, which office he filled with marked ability. Among a number of foreign disputes settled during his incumbency was the one relating to the Alabama claims.

FISH CULTURE (kŭl'tŭr), the industry

embracing the education and labor devoted to the growth and propagation of fish. The ancient Egyptians and Chinese were highly skilled in pisciculture and gave it marked attention, for the reason that the subsistence of large masses depended to a vast extent upon the food-producing qualities of their interior and adjacent waters. Since then the art may be traced through successive centuries. It is not difficult to realize the vast benefit that the industry yields to the people of western Europe, and its wholesome influence upon the industries of America. Since the large fish feed upon the smaller, and the latter upon the eggs, it is apparent that their influence, in connection with widespread operations in fishery, tends to greatly limit and ultimately depopulate the waters of the finny tribe. The discoveries made by Stephen Ludwig Jacobi, of Westphalia, Germany, in 1748, led to the art of increasing fish by stripping the females of their eggs and fertilizing them by the milt taken from the male fish. From this discovery and those made later by L. J. R. Agassiz it became possible to breed and rear fish more extensively than had been possible previously, and by skillful application and care preserve, feed, and fatten them. We find as a result that waters before unproductive have been populated with various varieties, such as the California salmon, California brook trout, char, whitefish, shad, and German carp. Many streams and lakes have been populated with varieties of fish, as the shad, which has been planted in the rivers of Georgia, and the whitefish fry in Lake Erie. Besides, the waters of California, Canada, and many European countries have been restocked, and the more valuable kinds largely increased.

Much advancement has been made in fish culture in the United States, where it is now pursued more extensively than in any other country. The industry is under the jurisdiction of the United States fish commission, a bureau established by act of congress Feb. 9, 1871. The primary object originally was to investigate the food fish of the seacoast and inland waters of the United States. Since then the offices of the bureau have been widely extended, and the whole now constitutes one of the most important in the service of the government. Many valuable reports and bulletins have been distributed annually, these relating to various branches in the different phases of the industry, and have been instrumental in disseminating accurate and scientific knowledge of the art. The several states have been supplied with various kinds of fish, the annual distribution often aggregating 200,000,000 eggs and fish, of which three-fourths are infant and adult fish and about one-fourth eggs. At colleges of agriculture and other institutions under state and federal control, such as are now quite common, the industry has been carefully studied and is maintaining a wholesome interest and tending to further productive influences. Along with fish culture proper, the artificial culture of lobsters, oysters, mussels, and other crustacea is growing in importance.

FISHER, George Park, historian and clergyman, born in Wrentham, Mass., Aug. 10, 1827. In 1847 he graduated from Brown University, studied theology at Yale and Andover, and later took a course of instruction in Germany. Shortly after returning to America he secured a professorship of divinity at Yale, and served as pastor of the college church in 1854-61. In the latter year he secured the appointment of professor of ecclesiastical history of Yale Divinity School, and five years later became an editorial writer for the "New Englander." Among his writings on ecclesiastical and other topics are "Christian Religion;" "Beginning of Christianity;" "History of the Reformation;" "Colonial History of the United States," and "Nature and Method of Revelation."

FISHERY, the business of catching fish or other aquatic animals, but relating also to the locality where marine life and fish are found in paying quantities. The objects for which fishing is conducted include pearls, corals, sponges, whales, turtles, shell-fish, seals, and many others, besides the various species of fin-fish. Among the chief methods of fishing are those employing draw-nets, spears, lines, and dredges. The most important of the fresh-water fisheries include those of the salmon, in which sportsmen employ fly hooks, while fishers generally use stake-nets and draw-nets. Other important fresh-water fish embrace the perch, eel, trout, pike, and catfish. Measured from the standpoint of profit, the oyster, cod, herring, and haddock are the most productive sea fisheries. Countries bordering on the sea naturally possess the most valuable fisheries, among which the United States takes very high rank.

Disputes regarding fishery rights have taken on the form of international questions, and have occupied the attention of diplomats, especially those involving the United States and Great Britain at different times. The Bering Sea question, which occupied the attention of both governments for some time and attracted particular attention in 1896, is one of the most important. Under the fishery laws the owner of the soil and streams, or bodies of water, is entitled to the exclusive right to fish in such water. Where the owner has land adjacent to both sides of the stream, he enjoys the sole right to fish in the entire stream lying between his property, and, where his possessions are only on one side, his right extends to the center of the stream. In streams and bodies of water belonging to the state or federal government, the right to fish is abridged or authorized by general laws. In many of the states fishing

is strictly prohibited, except at certain periods of the year, even in the bodies of water belonging to private owners, while in some it is made unlawful to fish with drawnets and to use more than two or three hooks on a line. Such legislation is deemed necessary in order to protect the waters from being totally depopulated, and to preserve a fair aggregate of the different kinds of fish at all times. Besides, damaging influences, such as dams, the discharged sewage, and other unwholesome and obstructive agencies, are prohibited under suitable penalty, and it is made the duty of officers to prosecute investigation for proper protection.

FISH HAWK, an eagle or other rapacious bird that preys upon fish, as the bald eagle or the osprey. This genus of birds is

FISH HAWK.

widely diffused, being found both in warm and cold climates, and is grouped with the family falconidæ. It is singular among the falcons in preying exclusively upon fish, and to this end its whole structure and habits are adapted. The fish hawk is about twenty-two inches long, of a dark-brown color variegated with gray and white. It has a short, broad, rounded bill, long tail and wings, and remarkably rough, scaly, pointed toes, suitable for grasping its slippery prey. The feathers are destitute of supplementary plumes and very oily. These birds are found near the sea, lakes, or rivers, and are everywhere birds of passage, going toward the warmer zones soon after the appearance of frost. They catch their prey by diving into the water and grasping it with the talons.

FISK, Clinton Bowen, soldier and educator, born in Greigsville, New York, Dec. 8, 1828; died July 9, 1890. His parents removed to Michigan in 1830, where his father founded the town of Clinton. After studying at Albion and Ann Arbor, he settled in business in Coldwater, Michigan, and later in St. Louis, Missouri. In 1861 he entered the Union army, was promoted successively until he attained to the rank of brevet major-general, and became a commissioner of the Freedmen's Bureau. Later he founded the Fisk University at Nashville, Tenn., an institution for the education of colored men and women, of which he was president until his death. Numerous educational and religious institutions received the benefits of his munificence. In 1888 he was nominated for president of the United States by the prohibition party.

FISKE, John, celebrated historian and lecturer, born in Hartford, Conn., March 30, 1842; died July 5, 1901. In 1863 he graduated from Harvard University, studied law, and lectured at Harvard on philosophy and history, serving also as assistant librarian. He became recognized as a deep and forcible thinker and a powerful lecturer, by which he attracted the attention of both Darwin and Herbert Spencer. His special subjects in writing and lecturing were evolution and history, two themes in which he took marked interest. He lectured on American history at the University College and Royal Institute of Great Britain in the winter of 1879-80, where he became highly popular. After returning to America, he was appointed professor of American history in Washington University, St. Louis, though he made his home at Cambridge, Mass. His contributions to the subject of evolution have attracted widespread attention, while those relating to the history of America are thoughtful, scholarly, and imperishable. Among his publications on evolution are "Myths and Myth Makers;" "Destiny of Man;" "Excursions of an Evolutionist;" "Outlines of Cosmic Philosophy," and "Idea of God as Affected by Modern Knowledge." Those relating to history include "History of the United States for Schools;" "War of Independence;" "Beginning of New England;" "American Political Ideas;" "Civil Government of the United States," and "Critical Period of American History."

JOHN FISKE.

FISK UNIVERSITY, an institution of higher education for colored persons, organized by Clinton Bowen Fisk at Nashville, Tenn., in 1865. The institution is co-educational under the nominal jurisdiction of the Congregational Church, and maintains courses of study in medicine, theology, normal teaching, industrial arts, and advanced sciences. There are about thirty instructors, 400 students, a fine line of apparatus, and a library containing about 10,000 volumes.

FITCH (fich), **John**, inventor, born in South Windsor, Conn., Jan. 21, 1743; suicided in 1798. He was the son of a farmer, secured a common school education, and went to sea at the age of seventeen years. Later he became successively a clockmaker,

brass founder, and silversmith. Subsequently he served as deputy-surveyor in Kentucky, and in 1786 founded a company for experimenting in steam navigation. He built a steamboat for conveying passengers on the Delaware, which developed into a successful enterprise, though the immediate undertaking proved a losing one and caused the dissolution of the company. In 1793 he proceeded to France for the purpose of introducing his invention, but met with no success. On returning to America he found squatters had settled on his property purchased in Virginia, while his invention brought him nothing but disappointment and poverty, which finally led to his sad death. The steamboat built by Robert Fulton was declared by a committee appointed in 1817 to be practically the same as John Fitch patented in 1791. It is certain that the result of his labor and ingenuity has been of lasting benefit to commerce and industrial enterprises.

FITCHBURG, a city of Worcester county, Massachusetts, on the Nookagee River. It is connected by numerous important railroads, has extensive municipal facilities, and during the last several decades has enjoyed material growth. The public buildings include numerous churches, several high schools, a public library and art gallery, and a public hospital. Educational advancement is facilitated by a number of scientific societies, while the library, containing about 25,000 volumes, is a resourceful convenience. Among the principal manufacturing establishments are iron foundries, machine shops, cotton, woolen and flour mills, paper mills, shoe and shirt factories, and wood-turning establishments. The streets are finely paved, well lighted, and connected with suburban districts by electric car lines. There is a growing trade in merchandise and farm produce. Population, 1900, 31,531.

FIVE FORKS, the site of a battle fought in Dinwiddie county, Virginia, April 1, 1865. It was Grant's intention to cut General Lee off from Petersburg, and accordingly dispatched Sheridan with cavalry and Warren with infantry to the extreme left, where Lee had stationed Pickett. Sheridan attacked the intrenchments at Five Forks held by Pickett's corps, but was driven back. On the next day he was reinforced by Warren's corps and carried the fortifications, taking 5,000 prisoners. The Union loss was 1,000 men. As a result Petersburg evacuated on April 2, and Richmond fell soon after.

FLAG, a banner used as a mark of distinction by a company, party, sovereign, or nation. It consists of a piece of cloth, usually square, oblong, or triangular. The material is commonly of bunting, either plain or bearing a device, and is displayed as a standard, symbol, or signal by being attached by one edge to a staff, or to a halyard, by which it may be hoisted on a pole. The Egyptians originated the idea of standards early in their history, which is verified by inscriptions on very ancient sculptures and temples. That the Greeks and Romans followed by the adoption of standards and ensigns is clearly borne out by the gonfalon, which was borne in the Roman army near the commander-in-chief during an engagement. In the Middle Ages the pennon was used by a knight, while the standard served the purpose of distinguished persons. The cross appeared in the banners of the Crusaders during their historic upheavals in mediæval European history.

The flag of Denmark is the oldest among European standards. It is red with a white cross, and dates from the 13th century. The union of the three crosses of St. George, St. Andrew, and St. Patrick designated first the union of Scotland with the kingdom of Great Britain; later the union of this kingdom with Ireland; and is known as the union jack, which at present constitutes the naval flag. In the British flag is a quartered field, one quarter blue, one quarter yellow, and two quarters red, which bears the insignia of Ireland, Scotland, and England. The imperial flag of the German Empire is yellow, containing in the center the imperial arms and a gold shield. It is divided into quarters by the iron cross, three black eagles and the crown appearing on each of them. The Turkish Empire has a red flag, with eight pointed stars and a crescent moon; the latter became historic in distinction from the cross of the Crusaders. Russia has a yellow flag, on which the Russian arms are conspicuously displayed, but its naval flag is white with diagonal bars of blue. All nations and many sovereigns, states, principalities, and provinces have flags appropriate to their purpose, usually bearing a more or less decorative field in commemoration of some historic event.

Flags are borne on the masts of ships to designate the country to which they belong and to indicate the rank of the commanding officer. The regiments of an army are distinguished from each other by the flags they bear. A yellow flag borne on a vessel denotes quarantine; a red flag, that powder has been taken on board; while a white flag is by consent of all nations a flag of truce, and a vessel bearing such a flag is met by a vessel or boat under charge of a commissioned officer bearing a white flag. When a flag is lowered or hoisted to half the height of the staff on land, or to half the mast of a ship, it indicates mourning. Aside from their use as emblems and to designate certain officers, flags serve an important purpose in mercantile and national navies as signals by which to communicate, also for weather, railway, survey, and other signals.

In America the colonies used the British flag prior to the separation from England, though several others had been proposed early in the agitation for separation. The first was one bearing the inscription "Join,

or die," and, when the purposes of resistance to British tyranny began to assert themselves more forcibly, a flag bearing a rattlesnake was designed, and the motto, "Don't tread on me," conspicuously displayed. The present national flag, called the stars and stripes, originated June 14, 1777, when the continental congress resolved that the flag of the United States be thirteen stripes, alternate red and white, and that the union be thirteen white stars on a blue field. Congress changed the flag to fifteen red and white stripes and fifteen stars in 1794, but in 1818 an act was passed by which the original thirteen stripes and fifteen stars were restored, as the addition of a new stripe for each additional state would make the flag unwieldy. At that time it was provided that the thirteen horizontal stripes, which represent the thirteen original states, should be continued, while a new star should be added to the number with the admission of a new state into the Union, the addition to take effect on the Fourth of July next succeeding the admission. The first flag under this law was hoisted over the United States house of representatives in 1818, and remains unchanged, except as to the number of stars. The last addition of a star was made in 1896, when Utah was admitted to the Union.

FLAGEOLET (flăj'ō-lĕt), a wind instrument with a mouth-piece like a common whistle. It resembles the flute, is usually made of boxwood or ivory, and owes its invention to Sieur Juvigny, in 1580. Flageolet-tones is the name given to the harmonic notes of the violin, violoncello, and other stringed instruments, which notes are produced by lightly touching the strings with the finger, thus producing a node, the string vibrating on both sides of the finger. See **Harmonics.**

FLAMES, Temperature of, a subject to which Rosetti gave much thought in 1878. After conducting careful investigations with his calorimeter, he announced the following table of results:

Locatelli lamp	1,688° Fahr.
Stearine-candle	1,724° Fahr.
Petroleum-lamp with chimney	1,886° Fahr.
Petroleum-lamp, without chimney—	
Illuminating part	1,688° Fahr.
Sooty envelope	1,436° Fahr.
Alcohol-lamp	2,147° Fahr.
Bunsen burner	2,480° Fahr.

The temperature of an electric arc, as determined by Violle, is about 6,332° Fahr.

FLAMINGO (flă-mĭn'gō), a genus of migratory birds which until recently were placed among the waders, but now generally rank among the swimmers. However, they very seldom use their webbed feet for swimming, the web formation being designed rather for support on the soft, muddy bottoms. The body is not large, but the long neck and legs allow them to stand from three and a half to four feet high. In many respects the bill resembles that of a duck, but turns suddenly downward near the middle, the mandible being furnished with small tooth-like edges, which serve to prevent the escape of small crustaceans, mollusks, worms, fish, or seeds, their common food. Flamingoes are birds of powerful wings and

FLAMINGO.

fly either in single file or in wedge-shaped flocks like geese, a single bird leading the way for the flock. The prevailing color is pinkish or reddish. The nest is made of mud scraped into a mound with the feet and hollowed out on top, in which two or three white eggs are laid and hatched, the young reaching maturity in about a year. Flamingoes inhabit Eurasia, Africa, and America. When feeding, they keep their feet continually going to stir up the mud. Some of the older birds act as sentinels for security to the rest.

FLAMMARION (flä-mä-re-ōn'), **Camille,** celebrated astronomer, born in Montigney-le-Roi, France, Feb. 15, 1842. In 1858 he entered the Paris observatory, and soon after became distinguished as a lecturer on astronomy. In 1865 he retired as a lecturer, and devoted his time largely to the publication of books and contributions to periodicals. For the purpose of studying aërial phenomena, he made numerous balloon ascensions, and in 1892 published an elaborate treatise on the theory that communication with the earth and planets nearest us is not impossible. Among his works are "Studies and Lectures on Astronomy;" "Marvels of the Heavens;" "Stars and the Curiosities of the Heavens;" "God in Nature;" "Plurality of the Inhabited Worlds;" "Imaginary and Real Worlds," and "Travels in the Air."

FLANDERS (flăn-dẽrz), a region of Europe extending along the German Ocean, and now included in Belgium, Holland, and France. The original inhabitants were Belgic tribes, who were subdued by Cæsar and the region added to Roman Gaul. Later it came into the possession of the Franks, and was added to Neustria by the treaty of Verdum. Philip the Bold erected

the territory into a government district in the 9th century and assigned it to his son-in-law, Count Baldwin I. In 1016 the town of Valenciennes was added and Ghent, on the Zealand Islands, became a part of the district about the same time. Hainault, Alost, and Tournai were added in the reign of Baldwin V., after whose death it was divided and passed consecutively to various countries.

In the 12th century the manufactures and commerce of Flanders rose to vast importance, and in the former part of the 14th century the Flemings were able to contest successfully with France. The latter country resigned its claims to Flanders in 1526, and afterward it passed to the united houses of Austria and Spain, though Charles V. of Germany ultimately secured control of the larger portion. A part was united with the Netherlands by the treaty of Westphalia, and other portions to France by the treaties of the Pyrenees in 1659, Nimeguen in 1678, and Utrecht in 1713. The other portions then remaining independent now form the provinces of East and West Flanders in Belgium. East Flanders has an area of 1,160 square miles and a population of 940,500. The area of West Flanders is 1,248 square miles and its population 735,750. Ghent is the capital of the former and Bruges of the latter. The soil is productive and carefully cultivated, while the manufactures of the various products, such as laces, linens, and damasks, excel in quality.

FLANDRIN (flŏN-drăN'), **Jean Hippolyte**, painter, born in Lyons, France, May 23, 1809; died in Rome, March 21, 1864. He ranks as the most renowned French historical and religious painter of the last century, and decorated numerous churches in France in 1842-45. Among his most noted productions are "St. Clair of Nantes;" "Christ Going Up to Calvary," and "Christ Entering Jerusalem." The latter is at the Parisian Church of St. Germain.

FLANNEL, a woolen fabric differing from broadcloth and cashmere in being woven of yarn more loosely twisted. It varies in degree of fineness, and is used very extensively for shirts and undergarments. By allowing the perspiration easy passage and not appearing cold to the body, if damp, it is cooler in summer and warmer in winter than other fabrics.

FLAT-HEAD, the name applied to various Indian tribes, owing to their custom of flattening the skulls of infants by pressure. This practice was common to the fish-eating Chinook Indians on the Pacific coast; to the ancient natives of Peru, both previous and subsequent to occupation by the Incas; among the Caribs of Florida and Central America, and, it is thought, among the mound-builders of the Mississippi valley. The civilized Selish Indians are improperly called Flat-Heads, as they do not flatten the skulls of their children. They originally inhabited the valley of the St. Mary's River, but conveyed their lands to the United States, and were moved to Idaho in 1871, where they occupied the Jocko reservation. They were always peaceable, and are now advanced in education and the industries.

FLAX, an annual plant with alternate linear-lanceolate leaves, many-flowered, broad cymes, usually yellow, blue, or white,

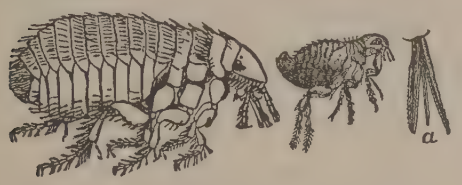
FLAX. FLOWER AND SEED-POD.

and crenulate petals. There are a hundred species, which grow more or less widely distributed in all warm and temperate climates. Flax was cultivated by the Egyptians 5,000 years ago, and linen is spoken of in the Book of Joshua. The largest yield is reported in the United States, but there are also considerable productions in India, Russia, Argentina, and Algeria. The fiber constitutes tow, which is spun into a thread, and this is woven into cloth. Flax is very extensively raised on account of the commercial value of the seed as well as for its fiber. In most countries the virgin soil, when first broken, produces the best yield of flax, one crop often paying the purchase price of the land. Linseed oil is pressed from the seed, while the residue is a highly fattening food for hogs and cattle. See **Linen, Linseed Oil.**

FLAXMAN, John, distinguished sculptor, born in York, England, July 6, 1755; died Dec. 9, 1826. He entered the Royal Academy as a student in 1770, where he later made models and designs for the potter, Josiah Wedgwood (1730-95), and in the same year won a silver medal. He went to Rome in 1787, where he studied seven years and produced numerous designs to illustrate Dante, Homer, and Æschylus. In 1794 he returned to London and three years later was elected as associate of the Royal Academy, and in 1800 became a royal academician. Among numerous excellent productions is a fine monument in Westminster Abbey built to

Lord Mansfield. The Royal Academy appointed him professor of sculpture in 1810.

FLEA, a wingless insect, belonging to the hopping diptera. It has two lancet-like mandibles, a sucker, and a slender, bristle-



DOG FLEA. COMMON FLEA. *a*, proboscis.

like tongue, the whole incased between two three-jointed plates. The entire body is covered with a tough integument. It is very active and can leap two hundred times its length in a single bound. The common flea thrives particularly in the nests of poultry and on the fowls themselves. Some species infest the furs of animals and often prey upon man. In favorable weather fleas hatch in five or six days; in about twelve days they enclose themselves in a cocoon, and after eleven days more come out perfect insects.

FLEMISH (flĕm'ĭsh), the language spoken in a number of Belgian provinces, portions of Holland and France, and several countries adjacent to these. It is a form of Low German, or Platt-Deutsch, and differs but slightly from the German in pronunciation and orthography. In East and West Flanders, Limburg, Antwerp, and Brabant it is the universal tongue and gives evidence of but little change in dialect since the 8th century. The language spoken is very similar to the form of speech used by the council of Liptines in 742, while preparing a creed in which pagans renounced idolatry and embraced the Christian faith. Jakob Van Maerlaut is regarded the father of Flemish poetry, and wrote several romances in which he treats the "Holy Grail," while "Reynard the Fox" and the "Mirror of History" were produced in the same period. In 1618 a translation of the Bible was made into the Flemish, and contains such elegance of expression that it is regarded the standard authority in orthography and construction. French ascendency tended to limit the language and literature, but after the revolution of 1830 it began to revive and take on its present excellent form. Among the noted leaders in the revival of Flemish may be named Blommaert, Conscience, Van Duyse, Snieders, De Lact, Willems, Van Ryswyck, David, Bermans, Belderdyk, and Snellaert.

FLINT, a mineral regarded as a variety of quartz, or as intermediate between quartz and opal, consisting almost entirely of silica. It contains slight traces of oxide of iron, lime, and carbon, and also of organic matter. Flint is usually gray, smoke-brown, or brownish-black, but is sometimes spotted or mottled. Dark-colored varieties are usually found imbedded in chalk and are abundant wherever chalk formations prevail. Flint, when struck with steel, produces a spark of fire, which property was formerly made use of in firearms and for starting fires. Knives, axes, arrowheads, and various sharp weapons and cutting instruments are among the most interesting relics of antiquity.

FLINT, a river of Georgia, rises in Clayton county, and flows by an irregular course to the southwest corner of the state, where it joins the Chattahoochee to form the Apalachicola River. The entire course of 300 miles is through a rich agricultural and mineral country. Light-draft steamers navigate it as far as Albany, a distance of about 140 miles from its mouth.

FLINT, an important city of Michigan, county seat of Genesee county, situated on the Flint River, about sixty miles northwest of Detroit. A number of railroads connect it with the commercial centers of the northwest and east. Electric car lines, waterworks, telephones, pavements, and electric lighting are among the municipal facilities. There is a fine courthouse and many school and church buildings. It is the seat of Oak Grove Home, an institution for the feeble minded, and of the state institution for the deaf and dumb. The principal manufactures include clothing, woolen goods, flour, machinery, cigars, vehicles, and utensils. Its jobbing trade is important, while the surrounding country produces large quantities of cereals and fruits. Population, 1904, 14,884.

FLINT GLASS. See Glass.

FLINT IMPLEMENTS, the utensils formerly used in performing manual labor and as instruments of war, and found frequently in the places occupied by settlements in prehistoric ages. They occur largely in all regions occupied in early times, though they are met with most numerously in European countries, particularly in Denmark, the Netherlands, and other countries of the northern and western parts of the grand division. These implements consist of chisels, knives, daggers, saws, scrapers, arrowheads, axes, and borers, and served a useful purpose, though modern savages do not employ such tools. The American Indians made arrowheads and other instruments of flint, many specimens occurring in different sections of America, but they are more abundant in the Mississippi valley than elsewhere.

FLOATING ISLANDS, the formations caused in lakes and other inland waters by the aggregation of driftwood carried down by rivers, and by deposits of soil and vegetable matter, or by detachments of elevations adjacent to the banks of rivers or on shores of lakes. These islands occur more numerously in tropical countries and receive their early consistency by interlacing roots of plants, and later by the growth of shrubs and even trees. Some of the islands are

large enough to furnish pasturage and are met with from fifty to a hundred miles from the mouths of the large rivers of Asia, Africa, and America.

FLODDEN (flŏd'dĕn), **Battle of,** a severe military contest that occurred on Flodden Hill, Scotland, Sept. 9, 1513, between the English army commanded by the earl of Surrey and the forces of James IV. of Scotland, in which the latter was defeated. The English army consisted of 32,000 men, and the Scottish of 30,000. Both sides lost heavily. The English army lost 4,000, while the loss of the latter was much heavier and included several earls and other officers of high rank.

FLORA (flō'rȧ), the goddess of flowers, held in the highest esteem by the Romans, and celebrated in a festival from April 28 to the first of May. The festival was one of universal merriment, in which houses, streets, and vehicles were profusely decorated with flowers. Two temples were built at Rome to this deity. She typified the season of spring, and was the reputed guardian and protectoress of every blossom.

FLORENCE (flŏr'ĕns) county seat of Lauderdale county, Alabama, on the Tennessee River. It is surrounded by a fertile agricultural and fruit-growing country, has excellent railroad advantages, and enjoys superior municipal facilities. Besides having fine public schools, it is the seat of a state normal school, an academy, the Synodical Female College, and the Southern University for Women. Among the manufactured products are cotton goods, cigars, machinery, vehicles, and building material. Near the city is one of the largest Indian mounds in the state. Coal deposits abound in the vicinity. Population, 1900, 6,478.

FLORENCE, a city of Italy, capital of a province of the same name, on the Arno River, about 140 miles northwest of Rome. Its site is in a beautiful valley surrounded by hills, while a number of bridges cross the Arno and join both portions. Several important railroad lines connect it with the commercial emporiums of Italy, and electric street railways, telephones, and other municipal facilities add to the convenience and comfort. Besides its commercial importance, it takes high rank in the manufacture of woolen and silk goods, porcelain, mosaic, hats, musical instruments, toys, and numerous objects in the fine arts. Its public buildings include several beautiful palaces and impressive structures, while many piazzas or squares give the city a reputation for elegance and convenience. Among the principal buildings is the cathedral founded in 1298, and dedicated with much display and impressive ceremonies in 1887. Michael Angelo found the dome of this historic structure a convenient model for St. Peter's, and in the cathedral are numerous sculptures by master artists, among them Michael Angelo. Other churches contain almost an equal wealth of master productions in sculpture and painting. The celebrated palaces include Uffizi, Vecchio, Signoria, Pitti, Strozzi, Il Bargello, and Riccardi. The cathedral of St. Maria del Fiore is the most remarkable building in the city. Many eminent Tuscans were buried in the church of St. Croce, which also includes excellent decorations and celebrated tombs, among them those of Galileo, Michael Angelo, Alfieri, and Machiavelli. Dante's monument by Piazzi is situated in Piazza St. Croce. A national library of more than 200,000 volumes and 12,000 manuscripts is located in the Pitti Palace, which also contains the celebrated Florentine gallery of art. There are numerous literary and educational establishments, a public school system, and fine institutions devoted to the arts, sciences, and higher educational interests.

The city of Florence was founded by the Romans in the 1st century B. C., and probably named from Fiesole, a beautiful mountain near its site. It fell under the dominion of Pope Gregory VII. in the 11th century, and by the middle of the 13th century it rose to commercial prosperity, ranking for many years as one of the first cities of Italy. An independent republic was established at Florence in 1283, and about fifteen years later great strife arose between rival parties under the names of Blacks (Ghibellines) and Whites (Guelphs), which resulted in the defeat of the latter and the banishment of the leading members, among them the poet Dante. The republic fell in the 16th century and it was placed under Charles V. of Germany, who became known as the duke of Florence, and was a member of the Medici. This dynasty ruled until 1737, when it was succeeded by Francis of Lorraine, who afterwards became emperor of Germany. The history of Florence is merged into that of Tuscany from that time until it became united with the kingdom of Italy. From 1864 to 1871 it was the provisional capital of the kingdom, whence dates its recent prosperity. The Florence school of art is the most important of Italy, while its literature is also of much eminence. Among the great men produced by Florence are Amerigo Vespucci, Galileo, Dante, Boccaccio, Michael Angelo, Vinci, Cellini, Sarto, Medici, Machiavelli, and Petrarch. Population, 217,500.

FLORICULTURE (flō'rĭ-kŭl-tūr), the cultivation of flowers or ornamental plants. While this branch of the industries has been carried on in Eurasia from remote ages, it is of comparatively recent date in the United States, and has been pursued as a business only about a century. In 1890 the government census detailed the first general information, but much of material value was added by the census investigations of 1900. There are 5,650 floral establishments in the United States, 375 of which are operated by women. It is learned from the best obtain-

able information that establishments of this kind are operated in all the states, and that over 1,000 acres of land is utilized. In 1900 the value of the annual production was placed at about $35,000,000, and it was learned that employment is given to about 22,000 men and women. The states of New Jersey, New York, and Pennsylvania take the leading rank in floriculture. Among the products are cut flowers, rose bushes, plants, and shrubs.

FLORIDA (flŏr'ĭ-dà), a southern state of the United States, bounded on the north by Alabama and Georgia, east by the Atlantic Ocean and south and west by the Gulf of Mexico. The larger part of the state is a peninsula extending about 400 miles south from Georgia, the remainder being a narrow strip of land, the western point of which lies 350 miles west from the Atlantic Ocean. Its total area is 58,680 square miles, nearly as large as that of Michigan, of which about four-fifths is contained in the peninsula. The southern portion is largely low and marshy, while the northern part is more elevated and somewhat broken, though no part of it rises to a great altitude above sea-level. There are numerous lakes in different portions of the peninsula, the most important being Okeechobee, which has an area of 650 square miles. The state has about twenty rivers that furnish more or less navigation facilities, the most important being the Suwanee, Pease, Withlacoochee, St. Johns, Choctawhatchee, Apalachicola, Kissimmee, and the Perdido, on the western boundary. Numerous islands abound near the southern portion of the peninsula, including the Dry Tortugas and the Florida Keys. The larger coast indentations are Apalachee Bay, Tampa Bay, Biscayne Bay, and Charlotte Harbor.

Its favorable situation between the temperate and tropical regions gives Florida an equable and agreeable climate. The freezing point is rarely reached, while the wholesome influences of the gulf and oceanic waters modify the climate agreeably during the warmer parts of the year. Statistics accord the state a very high position on account of its healthful climate, which fact is utilized by invalids from the north, who seek a genial and healthful region, especially during the winter season; St. Augustine, Jacksonville, and Key West are preferred as health resorts. Copious rains fall during the winter, while the summers are characterized by moderately dry, but agreeable and favorable conditions.

The productions are essentially tropical in character, and include tobacco, rice, cotton, sugar cane, coffee, flax, hemp, and many varieties of tropical fruits. There are also productions of corn, peanuts, sweet potatoes, and live-stock. Within recent years the silkworm and cochineal insect industries have been pursued with much success. Many regions of the state, particularly the savannas, furnish excellent grazing for sheep, horses, and horned cattle. Fish and game abound in the larger portion of the state, the latter including partridges, ducks, geese, deer, and wild turkeys. In many parts extensive areas are covered with forests that yield choice quantities of useful timber. Its fisheries, besides fish, yield oysters, pearls, and commercial sponges. The manufactured products of greatest value are furniture, woodenware, turpentine, pitch, tar, cigars, cotton-seed oil, meal, sugar, and textiles. There are also valuable fruit and oyster canning establishments. The minerals are found largely along the gulf coast, the most valuable being the phosphates, which aggregate about $5,500,000 in value annually. Railroads extend through all the northern and central portions, while several electric car lines and numerous canals have been built for passenger and shipping transportation. The total railroad lines aggregate 3,800 miles.

Educationally, Florida is making material progress, its educational institutions being well established and liberally patronized. The common schools, high schools, and state institutions all maintain articulated courses of study. A college of agriculture is located at Lake City; De Land College is at De Land; West Florida Seminary at Tallahassee; Rollins College at Winter Park; East Florida College at Gainesville; a state normal school for colored teachers at Tallahassee, and a state normal school for whites at De Funiak. Several other institutions are maintained, including those devoted to benevolent and reformatory purposes. All the leading religious and civic organizations maintain representative state and local institutions. There are 180 periodicals, of which twenty-two are dailies and 135 weeklies. Tallahassee is the capital. Other cities of importance include Key West, Jacksonville, St. Augustine, Pensacola, and Tampa.

The history of Florida begins with its discovery by Ponce de Leon in 1512, while in search of a mythical fountain whose waters would confer perpetual youth. De Soto explored it in 1539. In 1560 the French Calvinists founded a settlement, but were shortly after massacred by the Spaniards. The region remained in possession of Spain until 1763, when it was ceded to England in exchange for Cuba, though the Spaniards regained the country in 1781. The United States purchased Florida in 1819, and admitted it to the Union as a state in 1845. Many of the settlements were disturbed by the Seminole Indian wars in 1835-42, though these Indians were removed to Indian Territory shortly after. In 1861 Florida seceded from the Union, but was readmitted under the reconstruction policy of President Johnson. The state is divided into forty-five counties. It was named Florida, meaning land of flowers, by Ponce de Leon, but is popularly known as the Everglade State. The census of 1900 placed the population at

528,542. This includes a total colored population of 231,209, or 43.7 per cent., of whom 230,730 are Negroes.

FLORIDA KEYS, a group or chain of islands at the southern extremity of Florida, belonging for the purpose of government to Monroe county. The group includes thousands of islands, some of coral formation, and many are low, marshy, and uninhabitable. Key Large is the largest, but Key West is the most important. The latter contains the city of Key West and a naval station.

FLOTOW (flo'to), **Friedrich Freiherr von**, celebrated composer, born at Teutendorf, in Mecklenburg, Germany, April 27, 1812; died in Weisbaden, Jan. 24, 1883. After attending the schools of his native town, he studied under Reicha in Paris, and attained a reputation by his early operas. He was appointed superintendent of the theater in Schwerin in 1856, where he attained much success, producing numerous operas and symphonies. In 1863 he resigned, after which he resided mostly in Paris. Among his most celebrated compositions are "Stradella," "Martha," and "Indra."

FLOUNDER, a genus of fishes of the flatfish family, found along the shores of almost all countries. The body is often a foot or more in length, extremely flattened at the sides, and about one-third as wide as it is long. Like other flatfish, they usually swim on the left side, but reversed specimens are common. There are about 150 species, most of which occur in salt water, but several of the species thrive in fresh-water bodies. The color varies according to the ground where the fish live. Flounders are excellent and favorite food fish.

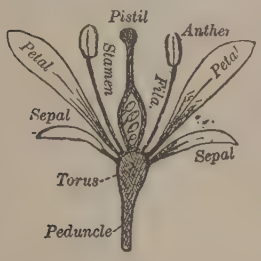
FLOUR, the ground and bolted portions of cereals, though specifically applied only to the products made of wheat. When applied to the finely ground substance of any other cereal it is usually specified, as rye-flour, buckwheat-flour. Among the principal food products flour is of vastly greater importance than any other, and, as an edible substance, enters into manifold convenient forms, such as bread, biscuit, cake, pudding, and crackers. Rice being the favorite food of the Mongolians of Asia, and entering quite largely the edible substances of other people, it is the only cereal that rivals flour as food for man. The cultivation of cereal plants is as old as the history of man, so also is the use of their seed for food. Various relics of remote antiquity indicate that crude devices were employed in the manufacture of flour from wheat and rye. The process consisted of crushing the grains in a cavity cut in stone by means of a conical piece of porphyry, crystal, or marble. In the later period of ancient Egypt and the early times of Rome the pestle and mortar served for crushing grain, which soon after led to the ox-mill and later to the water-mill. In early water-mills the process of grinding was effected by an upper and lower millstone. The latter had a slightly convex surface, over which the concave surface of the former fitted. The grain passing between the two in a slow but constant stream was ground to a mixed mass of flour, middlings, and bran, each of which was afterwards separated from the others. Modified forms of this class of mills are still used in newly settled countries and among people who do not manufacture vast quantities of flour.

In modern flour-milling it is customary to convey the wheat from cars into bins, from which it is carried by means of elevators into storage rooms at the top of the mill building, where it is kept until needed for grinding. The machinery for manufacturing flour is located usually on the first floor, and as the grain is let down all foreign matters are separated from it. In the cleaning process all the oats, chaff, dirt, dust, cockle, and other impurities are taken out by means of blasts of air, sieves, and powerful magnets, the latter removing all particles of iron that may have mixed with the grain in threshing and in transportation. After this process of cleaning, it passes consecutively between rollers or cylinders having spiral corrugations that operate to crush it. The first of these are coarse and serve to break the wheat into particles, but they become finer and are set more closely together until the last of the series effects a very high degree of crushing. The crushed wheat is next carried to complicated machinery in which the flour, middlings, and bran are separated. This machinery has been perfected to such a high state that remaining impurities can be removed and all portions of the wheat utilized to the best purpose. Roller-mills are now employed in manufacturing flour both from spring and winter wheat, and are propelled successfully by water, steam or electric power, though the first named is far the most inexpensive.

There are about 18,500 flouring mills in the United States. Those at St. Anthony Falls, Minneapolis, are propelled by water power and are the largest in the world. Pennsylvania has the largest number of mills, though most of them are small. A national association of millers is supported in the United States, which has numerous state branches and contains a number of mutual insurance companies. About 16,500,000 barrels of flour are exported from the United States annually, while the domestic market requires 75,500,000 barrels.

FLOWER, the bloom or blossom of a plant; the terminal bud inclosing the organs of reproduction. The stamens and pistils are the only essential parts of a flower. These are usually surrounded by floral envelopes, the calyx and corolla, but in the lily, crocus, and other endogenous plants they are not distinguishable. The leaves of the calyx are called sepals, and those of the corolla petals. In flowers the stamens, or male organs of reproduction, are composed of the filament,

anther, and pollen; the pistils, or female organs, of the style, stigma, ovary, and ovules. Where both stamens and pistils appear in one flower, it is said to be hermaphrodite or perfect; if only the stamens appear, it is unisexual or imperfect, and, if only the pistils, barren or sterile. Sometimes both calyx and corolla are wanting, when it is said to be naked; in others both stamens and pistils are wanting, when it is termed neuter or empty. An assemblage of flowers on a plant is called inflorescence. If there is no flower-stalk, or peduncle, of which the torus is the upper part, it is said to be sessile.



PARTS OF A FLOWER.

FLOWER, Roswell Pettibone, statesman, born in Theresa, New York, Aug. 7, 1835; died May 12, 1899. His father died when Roswell was eight years old, which necessitated working as a farm hand and as clerk to aid in the support of his father's family. Later he took a course in the Theresa high school, became a school teacher; later a jeweler, and in 1869 a banker in New York City. In 1881 he was elected as a democrat to congress, was re-elected in 1888 and 1890, and in 1891 became governor of New York. His administration as governor was eminently successful, among the events of note being his prompt and able disposition of matters relating to the cholera scare. In 1895 he retired from politics to manage his vast business interests, and expended large sums of money for charitable purposes. Among his donations were those devoted to building the Flower Hospital in New York and several large churches. In 1896 he opposed bimetallism, and aided in the defeat of his party in New York.

ROSWELL P. FLOWER.

FLOWERS, Artificial, the product of manufacture embracing imitations of real flowers, made of various materials. The Italians were the first to bring the art of making flowers to a high state of perfection, although the early Egyptians and Romans had developed it to a considerable extent. At present the Americans, Germans, and French excel in the output. About $250,000 worth each are exported from Germany and France annually, used chiefly for ornamenting ladies' and children's hats and bonnets. The materials used are various, including wax, shell, horn, whalebone, paper, rubber, ribbons, velvet, cambric, jaconet, calico, muslin, blown-glass, crape, gauze, and satin.

FLUIDS (flū'ĭds), the substances whose molecules change places freely by slight pressure. They include liquids and gases, as opposed to solids. Liquids possess no definite shape, but assume that of the vessel in which they are kept, except at the upper surface, which is level. Gas inclosed in a bottle presses upward against the cork as well as against the sides and base. From this fact liquids are said to be non-elastic fluids and gases elastic fluids.

FLUOROSCOPE (flū-ŏr'ŏ-skōp), an instrument employed to transfer X-rays into light, and by which an observer becomes able to see through several inches of wood, observe the bones of the living body, or other objects of dense construction in bodies usually opaque. It was devised by Thomas A. Edison, who tried over 800 different salts in experimenting to perfect a suitable instrument. The most satisfactory fluoroscope consists of a rectangular box a foot long, tapering toward the farther end, at which a fluorescent screen is placed. The inside of the box is painted black. The screen is made of pasteboard, covered with white paper and then coated with collodion, on which fine crystals of calcium tungstate are sifted. In passing four amperes through a Crookes tube, and holding an object between it and the fluoroscope, the observer can see through the screen and the object, and thus study visually the phenomena discovered by Röentgen.

FLUORSPAR (flū'ŏr-spär), the fluoride of calcium, which occurs especially in deposits of cobalt, tin, silver, lead, and other beds of metals. It is usually blue, green, yellow, or pink, though it occurs also in colorless and transparent forms. The annual American product is valued at about $115,000, and is obtained chiefly in Kentucky and Illinois. It is used as a flux in iron smelting, and in the manufacture of opalescent glass and hydrofluoric acid.

FLUTE, one of the oldest wind musical instruments. It has four joints, tapers toward one end, and contains a number of holes to be covered with the fingers or by keys. Some flutes have a mouth-piece; others are played by placing the lower lip close against the hole of the outside and blowing the air so its passage is broken against the opposite edge of the hole, causing the air inside the hole to vibrate. Its soft, pleasant tone and wide range in compass make it an important instrument in orchestral music.

FLY, an insect characterized by possessing but two wings, the posterior set being reduced to a pair of so-called balancing rods, or legs. The proboscis or under-lip ends in two flaps, which are used for lapping. A long list of pests belongs to the order of flies or

diptera, such as gad-flies, bat-flies, blow-flies, and the common house-flies. The eggs of a fly hatch into larvæ in about a day. They then pass into a quiescent pupa stage

1, MUSCID; 2, SYRPHID; 1 *a*, FLY'S FOOT.

for several days more, whence they issue as full-grown insects. Flies are enabled to walk on smooth surfaces and ceilings with their backs downward by a hair-like cushion which serves to hold them in place, partly by a glutinous fluid secretion and partly because of their ability to remove the air from below the feet by means of suckers through the hair, the pressure of the air on the outside serving to support the insect. The muscid, or house-fly, and the syrphid, or drone-fly, are well-known species of these insects.

FLYING FISH, a name applied to all fishes which have large pectoral fins and are able to sustain themselves in seeming flight through the air. There are numerous known species, about thirty, and two families, most of which are common to the warm zones. They swim in shoals near the surface and, leaving the water, often dart through the air for a distance of 200 yards or more. It does not seem true that these fishes leave the

FLYING FISH.

water merely to escape danger, as has been asserted by some writers, but also to exercise their powers for the delight which they take in the exercise. The flying gurnard, a spiny fish of the Gulf of Mexico and the Atlantic coast, emits a phosphorescent light in the night. Flying-fish often rise to the height of twenty feet, falling on the decks of ships. They are about a foot long and are held in high esteem as food.

FLYING MACHINE, a mechanical structure designed to navigate the air, and differing from a balloon mainly in that a flying machine is heavier than the air, while a balloon is lighter. Efforts to navigate the air by means of mechanical apparatus have been made for about five centuries and, though some degree of success has been attained, the problem is yet largely unsolved. Aëronauts constitute a large class who think air navigation possible only by means of balloons, while aviators have been multiplying in numbers, and believe it possible to perfect flying machines with which the air may be as safely navigated as the water or land. They have studied the structure and flight of large birds and from them have drawn lessons so valuable that the perfection of a flying machine is fast nearing its culmination.

In the 17th century Bernier, of Sable, France, constructed two pairs of wings, which he fastened to the shoulders and ankles with leather straps. By means of these mechanical devices he was able to guide himself in the air and fly for some distance, especially when starting by running from an elevation and thence moving over the valley beneath. In 1896 the secretary of the Smithsonian Institute, Professor Langley, completed his aërodrome, a flying machine that he sent up with much success, and perfected it to such a state that it was possible to move, ascend, and return successfully. O. Chanute, of Chicago, in the same year carried on elaborate experiments with his aëroplane, which enabled him to fly and soar quite successfully.

The German aviator, Otto Lilienthal, up to 1901 attained the greatest success in flying. In construction his machine was very closely modeled after the characteristics of birds. The apparatus had outspreading wings, which were made in imitation of the spreading pinions of a bird, and constructed of light wooden frames covered with cotton drilling. In flying the legs of the operator were free, thus enabling him to start by running or from elevations much like the larger birds, and by various means direct the course to be taken. On a number of occasions he soared to heights far above the starting point and moved over considerable distances. Dr. Danilewsky, of Charkov, Russia, completed and used a flying machine in 1898, which combined with aviation the principle of a balloon, and was so successful in making ascents that the United States appropriated $25,000 for experiments relating to aërial navigation. The investigations have lead to various results, such as combining steam, electric, gas, and compressed-air motors with the machines to secure motive power, and screw devices to guide and propel. On July 2, 1900, Count Zeppelin, a German cavalry officer, made a successful flight with his balloon flying machine. This machine combines the principles of a balloon and a flying machine. It cost $24,000. With it the operator attained a speed of twenty-two feet per second, ascended to a height of 1,300 feet, and traveled a distance of three and a half miles. See Balloon.

FLYING SQUIRREL, a species of the squirrel family, about five inches long, having a fold of skin extending along each side between the fore and hind legs. It does not

fly, but sails through the air as a parachute, getting its momentum by springing from a tree at a considerable height, descending obliquely until very near the ground, when

FLYING SQUIRREL.

it glides upward and usually alights at about one-third of the height from which it started. It has a brownish-gray color; the tail is about four inches long. The food consists chiefly of the young shoots of trees, nuts, insects, and small birds.

FOG, a thick mist at or near the earth's surface, resulting whenever the temperature of the air is reduced slightly below the dew point. The minute drops of water that form fog, though 800 times heavier than air, are prevented from settling rapidly by the resistance of the atmosphere. This is rendered possible by the minute size of the drops, which are much smaller than that of the relatively heavier dust-particles common in the air and wafted about by the wind. Fogs disappear on the approach of warm winds. Off the banks of Newfoundland the warm, moist air of the Gulf Stream is cooled by the cold air of the Labrador ocean current, hence frequent and almost constant fogs arise.

FOG SIGNALS, the signs communicated in foggy weather by sounding a whistle, ringing a bell, firing guns, or by other methods in order to avoid collisions and prevent vessels from running upon places of danger. Light and other signals cannot be seen, so notice can only be given by sound. The steam siren foghorn invented by Cagnard de la Tour, now employed by the United States lighthouse board, is the most effective signal used, and can be heard a distance of twenty to thirty miles.

FOLGER (fōl'gẽr), **Charles James**, jurist and statesman, born in Nantucket, Mass., April 16, 1818; died in Geneva, New York, Sept. 4, 1884. After studying law, he was admitted to the bar of New York in 1839, and the following year settled in Geneva to practice his profession. In 1856 he joined the republican party, was a state senator from 1861 to 1869, and in the latter year became assistant treasurer of the United States in New York, under appointment by President Grant. In 1871 he was elected to the state court of appeals. He was chief justice of New York in 1880, and in 1881 became secretary of the treasury under President Arthur. As a candidate for governor of New York, in 1882, he was defeated by Grover Cleveland with a majority of nearly 200,000.

FOLKLORE (fōk'lōr), a term used to signify the scientific study of popular customs, tales, superstitions, and primitive belief and usages. The term was compounded from several German words employed to designate this study, such as Volkslied and Volksfest. Though many trivial matters are taken into cognizance, the study has marked value in that it throws light on the origin and development of political and religious beliefs and ceremonies, as well as different ideas regarding the relationship between races. It is this feature of folklore that has made it of special value to historians, sociologists and writers on ethnology. Besides, through its study more comprehensive views have been formed. The science owes its origin to the Grimm brothers, who began collecting stories as told by peasants, and after a research of more than twelve years published their collection. Soon after intense interest was aroused in the establishment of folklore societies, the founding of journals and the publication of various books relative to these researches. The American Folklore Society was founded in 1888 at Cambridge, Mass., and has directed its energies largely to the publication of books and periodicals relative to the folklore of North America. Its official publication is the "Journal of American Folklore." Such excellent institutions as Johns Hopkins University have given their energies to the furtherance of interest in the science. North American folklore has been extended largely within recent years, and now represents an interesting fund of knowledge relative to the Indians, Aztecs, and Eskimos. Institutions having a like object are maintained in the countries of South America and Eurasia. By means of extensive research it has been possible to add a very useful and extensive fund of knowledge to the world's production.

FOND DU LAC (fŏn'dū-lăk'), a city in Wisconsin, county seat of Fon du Lac county, on the Fon du Lac River, about sixty miles northwest of Milwaukee. It is surrounded by a fine farming and dairy region, is an important manufacturing center, and has numerous railway lines. Among its principal buildings are an opera house, county courthouse, high school building, and many excellent churches. The manufactures include flour, ironware, woolen goods, furniture, machinery, and utensils. Its municipal facilities include street railways, gas and electric lighting, pavements, waterworks, and several parks. Population, 1900, 15,110.

FONSECA (fon-sā'kä), **Manuel Deodoro da**, first president of Brazil, born in 1827, died Aug. 23, 1892. After graduating at Rio Janeiro, he entered the army. In the

war of 1865 between Brazil and Paraguay he distinguished himself and rose to the rank of major. Later he became imbued with republican ideas, succeeded to the governorship of Matto-Grasso, and in 1889 led a revolution against Emperor Dom Pedro, in which the latter was expelled from the country. General Fonseca was made the first president of the republic, but, owing to his oppressive and self-seeking designs, his administration was brought to a close by a revolution and Vice-President Peixto was elected to succeed him.

FONTAINEBLEAU (fôn-tăn-blō′), a town in the department of Seine-et-Marne, France, near the Seine River, and about thirty-seven miles southeast of Paris. It is a clean, quiet place, with broad streets, and owes its fame chiefly to the palace of the kings. This is one of the most beautiful palaces in France. It was founded by Robert the Good in the 10th century, and has been greatly improved by many succeeding kings. The chateau, or park, in which it is situated is a magnificent expanse of forest, in which are fountains, statues, flowers, and artificial lakes. Napoleon detained Pope Pius VII. as prisoner at Fontainebleau for two years, and at the same place he also abdicated in 1814. The town manufactures porcelain and wines, and, owing to its extensive pleasure grounds, ranks as a favorite resort for visitors. Population, 14,500.

FONTENOY (fôn-te-noi′), a village in the province of Hainaut, Belgium, five miles southeast of Tourney. It is celebrated on account of a battle, on May 11, 1745, between the allied forces of Austrians, Dutch, and British and the army of France, each side numbering about 60,000 men. The French were commanded by Marshal Saxe and the allies by the duke of Cumberland. The result was a forced retreat of the allies, with a loss of 7,000 on each side.

FOOCHOW (fōō-chōō′), capital of the province of Fo-Kien, China, situated on the Min River, about twenty-five miles from its mouth. Massive walls surround the city, while its streets and buildings show more than the ordinary Asiatic progress. In 1843 it was thrown open to foreign trade, since which time it has developed large manufacturing and commercial enterprises. It has an extensive dockyard and arsenal, which are under the direction of European influences. The city is the seat of several scientific societies and numerous missionary organizations. Population, 631,000.

FOOD, any substance that, being taken into the body of animals or plants, serves, through organic action, to build up normal structure or replace the waste of tissue. Plants feed on the carbonic acid gas of the atmosphere and a series of chemical compounds found in the soil. The living plants change the soluble air-foods into plant tissues, cells, and granules under the influence of sunlight. Certain materials fitted to become the food of man or animals are stored in various parts of the structures, notably the roots, stem, and seeds, of which such as fats, sugar, starch, and proteids constitute the most noteworthy. Animals of the higher scale do not possess the power of changing the compounds of the soil and air into animal tissues. For this reason they feed directly upon the products of plant growth, or indirectly by eating flesh of other animals, and build up the complex animal muscle, fats, starches, and proteids, which are suitable for the food of man.

Liebig classified foods into those that serve for the nutrition of organized tissue, or flesh-formers, known as nitrogenized elements of nutrition; and those that are consumed in respiration, or heat-givers, called non-nitrogenized elements. These elements exist in some form of combination in almost every substance known as food, and are subservient to the function of organic action in the process of digestion. The diet list of most peoples includes fats and oils; the vegetable oils in the warm regions and the fats in the cold and temperate. Milk contains all the necessary food elements in the best form. Nitrogenous food-stuffs are found principally in the flesh of birds, animals, and fish; in milk, cheese, and eggs; in barley, wheat, oats, corn, and flour; and in beans, peas, and vetches. They are formed exclusively in plants, and undergo but little alteration when consumed as food and stored up by animals.

Fats are derived principally from milk, the bodies of birds and animals, and from the blubber of sea animals. The oils are obtained mostly from the olive, the palm, the cocoanut, the rape; from cotton and fish. Corn and some other grains contain more or less oil substances, and these, like most vegetable oils and fats, resemble those of animals. Starchy foods are most important in a normal diet. The starchy substances are derived mostly from the vegetable kingdom, and constitute the principal portion of the food of people who live in the tropical and temperate regions. The starches of the tubers, roots, grains, fruits, and milk embrace this class. These and other vegetable products contain hydrogen, oxygen, and carbon, but they differ in physiological properties from the oils. Water and salts are as essential for healthy nutrition as the proteid class, the former constituting sixty-eight per cent. of the human body and is one of the most important parts of foods. Besides, there are accessory foods, such as vinegar, coffee, tea, relishes, and spices, which are used more or less habitually, though the exact nutritive value of many of them is not known definitely.

The body needs a variety of food to support the different tissues. In the economy of growth it is required that both the carbonaceous and nitrogenous be taken in sufficient quantities. The very instinct of man sug-

gests the blending. Bread is eaten with butter; maccaroni, prepared with cheese; rice, boiled with milk; pork, baked with beans, and other food articles are mixed similarly. Food is oxidized in each cell of the body, though only a small portion of the albumen eaten is required in their reconstruction; the remainder, and the fats and sugars, are oxidized without becoming a part of the living cells of the body. The average man, in order to repair the waste caused by the oxidation of the cells, and to supply the requisite amount of heat and energy, must assimilate daily about four ounces of albumen, four of fat, and five of sugar or starch. To oxidize this it is necessary to breathe twenty-four ounces of oxygen. The weight of the body is increased by albumen being changed to fat, which occurs when more food is eaten than this amount of oxygen can oxidize. An increase in the breathing capacity enables the body to oxidize more food and lessens the bad effects of over-eating. Too much food causes plethora, while depriving the body of one kind of food for a considerable time causes it to suffer. When plain food is eaten slowly, hunger and taste are the most reliable guides as to quantity.

FOOT, a unit of linear measurement, containing twelve inches. A surface, each side of which is twelve inches, is a square foot, and is equal to 144 square inches. A cube whose sides are twelve inches is a cubic foot and contains 1,728 cubic inches. The foot unit was derived from the human foot. It is used extensively as a common measure, though its length varies in different countries. In music and poetry a foot is a term used to denote a melodic figure of notes with only one accent, or a succession of accented or unaccented syllables, which, being repeated, produce rhythm. The four principal feet in English poetry are the anapest, the dactyl, the iambus, and the trochee.

FOOT, the extremity of the leg below the ankle, and on which the body is supported. In man the foot is composed of seven tarsal and five metatarsal bones, so arranged and connected as to form an arch from the extremity of the heel to the ball of the toe, and the phalanges. The bones, where they articulate with one another, are covered with a considerable layer of elastic cartilage. Between the bone at the heel and the ends of the metatarsal bones is a heavy ligament known as the plantar ligament, which not only holds the bones together in the form of an arch, but protects the blood vessels, nerves, and muscles that lie above it in the hollow of the foot. Another very strong, elastic ligament holds the heel-bone and the central bone of the arch together. The head of the key-bone, upon which the tibia sits, rests upon this ligament. The different motions of the foot are effected by five muscles. They include the calf, attached to the thigh and leg and below by the tendon of Achilles to the heel-bone, which is the largest tendon in the body and sustains its weight in walking; the posterior tibial, attached at one end to the tibia and the other to the instep bone (scaphoid); the short fibular, attached to the fibula at one end and to the outer metatarsal bone at the other; the anterior tibial, which raises the toes and turns the foot outward; and the third fibular, whose tendons pass in front of the ankle on either side of the foot and raise the inner or outer border of the foot. The bottom of the foot is padded with fat and covered with a strong, tough skin.

FOOTBALL, a popular game played by pupils in the higher grades of the public schools and by students of colleges and universities, especially during the colder season of the year. It is an ancient game, having been popular during the prosperity of ancient Greece and Rome. The northern countries of continental Europe adopted it about the time of the Roman invasions, while the Danes popularized it in Britain, where it became famous as a Shrove Tuesday sport as early as the 12th century. Though popular for centuries, it has taken a wider hold on the world of sport within recent years and is played with an ever-increasing fervor. Among the numerous and widely known associations are those called Rugby Association, Australian, and American Intercollegiate. Each of these and many others have definite rules, under which the members practice in the art of playing, and at specified times engage in competitive games with other associations. The associations organized at Harvard, Princeton, Yale, and the University of Pennsylvania have been known as the "big four," while similar association ties have been accorded to the Western, Canadian, Indian, and other groups of organizations.

The game is played by teams of from eleven to twenty-two players, upon a level field. Scoring is possible in the field of the opposing side, either by getting the ball through or over a goal, or by passing it over a certain line. Each side, therefore, with the view of scoring, sends the ball in the direction of the opponents' end of the field. This may be done in two ways—by kicking and running, or by advancing it in any way except by running. The field is usually 160x330 feet, and the ball is made of leather, having a large ellipsoidal form. Among the officials are two linemen, an umpire, and a referee. The losses and advances on either side are watched by the linemen, fouling is prevented by the umpire, while the referee keeps account of the ball. In most associations the entire time of the game is ninety minutes, divided into two portions of forty-five minutes, with an intermission of ten minutes intervening. The principal rules are known as the Association Rules and the Rugby Rules.

FOOTE, Andrew Hull, naval officer.

born in New Haven, Conn., Sept. 12, 1806; died in New York, June 26, 1863. In 1822 he entered the navy as midshipman, became lieutenant in 1830, and captain in 1849. When the Civil War commenced, he was given the command of the western flotilla, and accorded a vote of thanks by congress for valuable services rendered in the capture of Forts Henry and Donelson and Island No. 10, and soon after made rear-admiral. In the capture of Fort Donelson he was wounded, and subsequently placed in charge of the bureau of equipment and recruiting. In 1863 he was given command of the fleet off Charleston, but died before reaching the place where he was to operate.

FOOT ROT, a disease common among sheep. The most prevalent form is due to an unusual growth of hoof, which causes the margin or toe to turn downward and ultimately crack, thus causing openings in which dirt and sand readily lodge. As a consequence the feet become swollen and ultimately ulcerated between the toes, where proud flesh forms and causes decay.

FORAGE, a term used to designate any food suitable for horses, cattle, and sheep, including such as hay, straw, and ensilage. Among the forage plants cultivated in the United States are clover, orchard grass, alfalfa, timothy, corn, broom-corn, and cane. However, the straw of such cereals as wheat and oats also constitute an important animal food product. The species of plants cultivated for forage depend upon the temperature, aridity, and moisture quite as much as upon the different kinds of soil. In many portions of the west native grasses still constitute an important forage crop, while in the east and the arid regions of the far west forage plants are cultivated with a high degree of care. In the west and southwest, where moisture is supplied by irrigation, the larger forage plants are cultivated extensively, such as alfalfa, cane, and millet.

FORAKER (fŏr'a-kẹr), **Joseph Benson**, statesman, born in Rainsboro, Ohio, July 5, 1846. His boyhood was spent on a farm. In 1861 he entered the Union army, serving to the end of the war. By faithful service he attained to the brevet rank of captain, and was aide to General Slocum's staff when mustered out. Shortly after the close of the war he entered Ohio Wesleyan University as student, and in 1869 graduated at Cornell. He was admitted to the bar of Ohio the same year. In 1879 he became judge of the superior court at Cincinnati, serving three years. He was elected governor of Ohio as a republican in 1885, which office he held until 1890. He was chosen as successor to Senator Brice in 1896, and has been distinguished as a prominent member of his party, taking high rank as a speaker and legislator.

FORBES (fôrbz), **Archibald**, special war correspondent, born in Morayshire, Scotland, in 1838; died March 31, 1900. After attending studies at Aberdeen University, he served for several years in the royal dragoons. In the Franco-German war of 1870-71 he served as special correspondent of the "Daily News." He also reported the interesting events of the communistic rising in Paris; those connected with the tour made by the prince of Wales in India, and later the events of the Russo-Turkish War. In 1879 he followed the armies in the South African campaign, during which he rode 110 miles in fifteen hours to report the victory gained at Ulundi. Later his various writings were published in book form, as were also the events in connection with his lecture tour in Australia and America. Among his productions are "Drawn from Life;" "Bivouacs and Battles;" "Glimpses Through the Cannon Smoke;" "Afghan Wars;" "Students of War and Events;" "Life of Napoleon III.," and "Life of William I. of Germany."

FORCE (fōrs), an exertion or influence that, if made to act on a body, has a tendency to affect or stop it if in motion, or to move it when at rest. Light, heat, gravitation, electricity, motion, cohesion, magnetism, and chemical affinity are thought to be manifestations of the force from which originate all phenomena of the material world. Mechanical force originates from life, gravitation, and the sources of heat, light, and electricity. To measure the effect produced by any mechanical force it is necessary that three things be known—the point of application at which the force acts; the direction in which the force acts, and the intensity with which it acts. When two or more forces act in the same direction, the resultant is equal to the sum of the forces. If two equal forces act in opposite directions, thus opposing one another, the body acted upon remains at rest, but if the forces acting are unequal, it moves in the direction of the greater with a force equivalent to their difference. Two forces acting at an angle with each other produce a resultant in an intermediate direction, the force of which equals the mean of the two acting forces. The resolution of any force comprises the components which produce that force, and the composition of forces is the combining of two or more into one.

Various terms are used to designate forces according to their nature and the manner in which they act. The most common classification includes parallel forces, constant forces, accelerating forces, resultant forces, uniform forces, and variable forces. By parallelogram of forces is meant the method of determining the direction and intensity of two forces, while unit of force implies a single force, whose terms being known, serves as a unit to ascertain the amount of any other force. The force exerted in a direction outward from the center, by a body moving in a circular path, is called the centrifugal force; while the centripetal force is exerted from without toward the center.

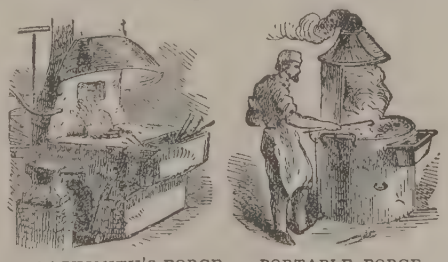
Since the centrifugal force is a consequence of the rotation, it ceases when the centripetal force ceases, and the body moves in a straight line. Centrifugal force is proportional to the mass and to the square of the velocity of the rotating body. If the mass of the rotating body be doubled, it requires twice the amount of force to prevent it from moving away from the center of motion, and, if the velocity be doubled, four times the force is necessary for it to retain its position. The motion of the planets around the sun affords good illustrations of centrifugal and centripetal forces. These bodies constantly tend to move away from the sun by reason of the motion originally given to them, while the attraction of the sun holds them in an almost circular path.

FOREST (fŏr'ĕst), a large tract of land covered with a natural growth of trees and underbrush, though often with intervening spaces of open ground. The countries of Europe have provided protection by law, by which it is designed to preserve the forests for judicious use, and prevent wholesale and needless destruction. Such acts of preservation operated to preserve many desirable tracts in Austria, Germany, France, and other countries, of which Epping Forest near London is a good example. Similar laws have been passed in the United States, and, besides, there has been legislation aiming to extend rather than abridge the forest area. The timber-culture law passed in 1872 remained in force twenty-one years and provided that 160 acres of the public domain could be acquired by cultivating ten acres of trees for a period of eight years. Under this act about 50,000,000 acres of trees were successfully cultivated in the great prairie regions of the west. The Nebraska state board of agriculture in 1874, under the suggestion of J. Sterling Morton, recommended that a day be dedicated each year to the planting of trees. This suggestion was acted upon by all the states and territories, not only through individual effort, but by the formal effort of public schools, which has resulted in the planting and culture of trees on private and public property. See **Arbor Day**.

Natural forests are found widely distributed where moisture is abundant and the temperature favorable to plant growth. The forests of the torrid zone are the most luxuriant, and cover vast areas along the streams and bodies of water, even to a considerable height above sea-level. As we proceed north and south from the equator we find the forests gradually decreasing in density and size of trees up to the higher latitudes, where they finally become rare and gradually disappear. The most extensive forests of the world are found in the valleys of the Amazon and Orinoco, the lake region of Africa, and in the southern parts of Eurasia. The higher altitudes, even in tropical countries, are destitute of forest growth, though plant life thrives in such regions at a much higher elevation than in the temperate zone and extends far into the higher latitudes, even to regions having much soil perpetually below the freezing point of water. At present the forest area of the United States is placed by the department of agriculture at about 500,000,000 acres. The annual lumber production equals 24,000,000,000 cubic feet, much of which is used in manufactures, railroad construction, fencing, building purposes, and for fuel. While there is danger of the visible supply decreasing beyond legitimate limits, the larger use of steel for construction purposes is relieving notably the demands annually made upon the forest. Besides, the consumption is affected by the increased use of coal, gas, and electricity for motive and heating purposes.

Forests are the natural home of many birds and wild beasts, and possess marked utility for their influence upon the occupations of man. Much of the soil has been enriched by the decaying trunks and foliage of trees, while they furnish shelter from winds and storms in the winter, and protection against the scorching heat of the summer. Their roots penetrate the soil and facilitate the entrance of water after rains, and the shadow of their branches retard evaporation; thus they extend the surface of moisture and visibly affect rainfall. This is further influenced by their tendency to prevent accumulated snows from melting rapidly, thereby counteracting floods, such as result where the forest area is robbed of its timber. Where forests do not abound, the rainfall rapidly runs off the surface and finds its way back to the ocean. Besides causing floods, this tendency visibly influences temperature and productiveness.

The forest area in the United States in 1900 was thirty-seven per cent. of the total area, exclusive of Alaska. About seven-tenths of the timbered area is between the Mississippi and the Atlantic coast. Of the entire forest wood seventy-five per cent. is coniferous, which requires about three-quarters of a century to grow to maturity. Forest fires and preparing ground for cultivation have been prolific sources of forest destruction. Schools of forestry are maintained in a number of the states, the first of which was established in New York in 1898.



BLACKSMITH'S FORGE. PORTABLE FORGE.

FORGE (fōrj), an open fireplace or hearth

with forced draft for heating iron, steel, or other substances. The term is also applied to a workshop where metals are forged. Forges were formerly made of brick, with a large leather bellows to furnish the blasts of air, but are now more generally made of iron and portable, getting the air from a rapidly rotating fan-wheel. All heavy forging, and much of the lighter, is done by hammers run by machinery. In the great Krupp works at Essen, Germany, is the greatest forge hammer in the world, and is so skillfully devised that it can be manipulated to gently crack a small nut or hard enough to crush a thick iron bar.

FORGET-ME-NOT, a genus of plants generally diffused over the north temperate zone. The flower is small, generally blue, has five petals, and a salver-shaped corolla. On account of its brilliancy of color, and being regarded as an emblem of friendship, it is a favorite flower in most countries.

FORMOSA (fôr-mō'sä), an island lying off the coast of China. It is separated from the province of Fo-kien by a strait about eighty-five miles wide. The island has a length of 240 miles, an average breadth of seventy-five miles, and an area of 13,540 square miles, being somewhat larger than the state of Maryland. The surface is mountainous, especially in the interior. Mount Morrison is the culminating peak, having a height of 12,850 feet. The population is principally of Malay origin, and engage largely in agriculture and manufacture. Among the principal products are sugar, rice, silk, tea, tobacco, camphor, vegetables, and many varieties of fruits. In 1860 four ports were opened to European commerce, and have since enjoyed marked prosperity. They include Ke-lung, Tamsui, Takow, and Taiwan, the latter being the local seat of government. About 500,000 Chinese immigrants settled in the western portion during Chinese occupation of the island, and have largely modified the industries formerly under the exclusive control of the Malays. After the war between China and Japan in 1895, it was ceded to the latter country by treaty, and now constitutes a Japanese possession. A native revolt occurred in 1897, but it was suppressed by the government, and local officials were enjoined to show a spirit of fairness and benevolence in the administration of public affairs. Within recent years several railroad lines have been built, the Japanese educational system established, manufactures encouraged, and the capital city supplied with means for efficient government. Population, 2,875,500.

FORREST, Edwin, celebrated tragedian, born in Philadelphia, Penn., March 9, 1806; died there Dec. 12, 1872. In 1820 he first played on the stage, and six years later appeared at the New York Bowery Theater, where he made a signal success in the character of "Othello." In 1836-37 he played with success in London, and afterwards visited other European cities. He made a second visit to London in 1845 in company with his wife and performed at the Princess' Theater. Intense jealousy arose between Forrest and Macready, the favorite actor of the English stage, and caused the former to lose favor in Britain. In 1849 Macready played "Macbeth" in New York City, which gave rise to a riot and resulted in the death of twenty rioters. Forrest made his last appearance on the stage at Boston in 1871. His success as an actor is attested by universal approval and an accumulation of a fortune amounting to $1,000,000. After leaving the stage, he built a beautiful mansion on the banks of the Hudson, erected an imposing house in Philadelphia, and left his fortune chiefly for the purpose of founding a home for poor members of his profession.

FORREST, Nathan Bedford, soldier, born in Bedford county, Tennessee, July 13, 1831; died in Memphis, Oct. 29, 1877. He first engaged in the occupation of a planter, became a slave dealer, and in 1861 raised a cavalry regiment to defend Fort Donelson for the Confederates. During the war he fought at Shiloh, Murfreesboro, and Chickamauga, became major-general, and in 1864 captured Fort Pillow by a skillful assault. Soon after he was promoted lieutenant-general. He was defeated by General Wilson in 1865, and surrendered a month later at Gainesville. Subsequent to the war he engaged in several railroad enterprises.

FORSTER (fors'ter), **Johann Reinhold**, traveler and naturalist, born in Dirschau, Germany, Oct. 22, 1729; died Dec. 9, 1798. He entered upon the study of theology at Halle, was ordained pastor at Nassenhuben, but continued to pursue his favorite studies of geography, mathematics, and history. In the second voyage of Captain Cook, he accompanied that navigator around the world and made many valuable researches. His description of the voyage was published in 1777. He became professor of natural history at Halle in 1780, where he labored in that capacity until death. Among his writings are "History of Northern Discoveries;" "Researches for Truths," and "Zoological Research."

FORSTER, John, political and historical writer, born in Newcastle, England, April 2, 1812; died Feb. 1, 1876. He was the son of a Unitarian and secured a good education in mathematics and the classics. At the age of twenty years he published "Lives of Eminent British Statesmen," and soon after formed the acquaintance of Dickens, Bulwer, and Carlyle. He was admitted to the bar in 1843, but never sought to develop a law practice. Soon after he succeeded Dickens as editor of the "Daily News," having previously edited the "Foreign Quarterly Review." His productions are largely historical, to which branch of study he gave special attention for many years. Among his writings are "Life of Dickens;" "Life

and Times of Oliver Goldsmith;" "Debates on the Grand Remonstrance," and "Life of Swift." His death occurred before the second volume of the latter was completed.

FORT DODGE, a city of Iowa, county seat of Webster county, on the Des Moines River, about eighty-five miles northwest of Des Moines. It is the focus of several railway lines, has excellent public schools, and is the seat of a college and a Roman Catholic seminary. It contains a federal government building and has a fine county courthouse. The manufactures include flour, ironware, clothing, oatmeal, tile, pottery, stucco, and machinery. The surrounding country is fertile, possesses extensive dairy interests, and is rich in coal, gypsum, and fire-clay deposits. Among the municipal facilities are paved streets, waterworks, electric and gas lights, and electric car lines. There is a large trade in cereals and merchandise. Population, 1900, 12,162.

FORT FISHER, a fortress below Wilmington, North Carolina, at the entrance to Cape Fear River. General Butler led a force of 6,000 men against the fortress in December, 1864, and was aided by Admiral Porter with a fleet of ironclads. The project of taking the fortress was abandoned after two days, but on Jan. 13, 1865, a second attempt was made by General Terry and Admiral Porter, which resulted in its capture. The Union army took 2,000 prisoners and 170 heavy guns.

FORTH, a firth and river of central Scotland, formed by the confluence of the Dhu and Duchray in Perthshire. The river is 170 miles long and merges into the Firth of Forth, a body of water extending fifty miles east from Alloa to the North Sea. The celebrated Forth Bridge, a railway viaduct at Queensferry, is 4,000 feet long. It was completed in 1889 at a cost of $8,000,000.

FORTIFICATION (fôr-tĭ-fĭ-kā'shŭn), a military defensive work, erected for the purpose of strengthening a place or position. The term also applies to the science of fortifying a position in such a way that it may be held by a body of men much inferior in numbers to their assailants. It implies a knowledge of the resistant power of materials as well as advantage in positions, so the construction may be devised in a manner that the enemy in attacking must of necessity suffer great loss. Fortifications are either regular or irregular as to construction, and, with respect to time, are distinguished as permanent and temporary.

The history of fortifications is as old as that of offensive and defensive warfare, though the process of construction has undergone numerous modifications, which were largely necessitated by improvements in the implements of war. The student of history finds numerous references to defensive fortifications as the different peoples are studied. Thus, we recall the story of Troy, in which it is related that the city stood safely against the Grecians until the colossal wooden horse was taken within its walls against the admonition of Laocoön. The walls of Babylonia were thirty-two feet thick, one hundred feet high and strengthened by great towers, while the walls of Jericho resisted the invading hosts of Israelites, and, according to the Scriptures, crumbled before them only after divine aid was extended. Many ancient walls of Asiatic cities still remain. Though having answered a good purpose in resisting the attacks with battering rams and ancient implements, they serve but illy when brought to a test against modern ordnance. Soon after gunpowder became known to the Europeans, they began to devise new implements of war, and likewise sought to counteract their effect by powerful works of defense. The Italians began in the 15th century to construct bastions, while the French engineer, Sebastien Vauban (1633-1707), who served under Louis XIV., developed the bastion system to such an extent that it still prevails in France as the general type of fortifications. However, this system has given way largely in most countries to the German polygonal system, which is also called the caponier system on account of employing numerous caponiers to span ditches, thus utilizing them instead of bastions for defensive purposes.

In constructing field fortifications engineers take advantage of position with the view that the enemy will be exposed to fire and cross-fire in making the attack. The general plan aims to require a hazardous march across an open field, in which those within the line of fortifications may at an advantageous time send forth detachments to make counter charges. Among the field fortification works are the redan, which forms an angle in front of the enemy, and has two parapets protected by a ditch; the redoubt, an enclosure with a parapet and ditch encirling it; and the lunette, a redan construction with numerous short flanks. These works are so constructed that they flank each other within the range of rifle fire, and are further strengthened by entrenched camps and by a series of rectangular or square redoubts. In case the time to construct is limited, such simple entrenchments as shelter trenches are speedily thrown up. These temporary forms consist of earth thrown toward the front, back of it being a ditch in which the rifleman lies securely protected from the fire of lighter implements. An abaltis of felled trees and barbed wire fences is effective in impeding the advance of the enemy, the latter being utilized extensively within recent years.

The fortifications of seaports are quite different from those constructed for the defense of interior positions. Heavy ordnance throwing dynamite shells and other powerful explosives a distance of six or eight miles have made it necessary to greatly revolutionize defensive warfare. The largest

guns obtainable are securely mounted, and by means of them the enemy's ships can be reached by the most powerful explosives and leaden balls. For additional protection the enemy's ships are watched with the aid of powerful electric lights, and swift steamers are utilized to scout. In many instances torpedoes plow under the water, by which it is aimed to strike the enemy's ships from below. The outer defensive works consist of submarine mines, which are set off by the enemy's ships, or by means of electric connection from the shore.

Permanent fortifications are those constructed of massive stone and iron works and are designed to defend important cities or strategic points. It is doubtful whether any fortress can be built that would form a serious obstacle to a modern land and naval attack, if the assailants were supplied with the most powerful modern guns. The greatest fortress in the world is the celebrated stronghold of Gibraltar, on the coast of Spain. It is considered impregnable to military assault, though this is due to its natural situation rather than to its artificial strength. Since modern guns have been able to obliterate practically all the older forms of fortresses, the newer are designed for offensive action rather than great strongholds of defense. They are constructed on the spherical plan, supplied with guns of the heavier caliber, and designed for special effect against ricochet firing. Places permanently fortified are enclosed by ramparts; the upper surface, called the terre-pleine, serves as the location of troops and cannon. Parapets or breastworks protect the terre-pleine against the fire of the enemy, while embrasures, through which the guns are fired, pierce the parapets at convenient intervals. Ditches about twelve feet in depth are excavated outside the rampart, often filled with water, and rendered serviceable in delaying the enemy's advance, along with wire fences and by other obstructions. Among the fortresses of the United States are Forts Monroe, McHenry, Pickens, Henry, Sumter, Webster, and St. Augustine.

FORT MADISON, a city in Iowa, county seat of Lee county, on the Mississippi River, about twenty miles southwest of Burlington. It is the seat of a state penitentiary, excellent public schools, and is extensively connected by important railroads. The manufactures include furniture, machinery, woodenware, flour, boots and shoes, paper, and leather. Its electric lighting and car system is extensive, while numerous other municipal facilities abound. The city has an important trade in farm produce and merchandise. Population, 1900, 9,278.

FORT MOULTRIE (mōō'trĭ), a fortification situated on Sullivan's Island, near the entrance to Charleston harbor, South Carolina. The fort was originally constructed of earth and logs, but was afterwards rebuilt in masonry. A British fleet made an unsuccessful attack upon it in 1776. In December, 1860, it was abandoned by Major Anderson, when it fell into the possession of the Confederate forces.

FORTRESS MONROE, the strongest fortification surviving in the United States, situated on Hampton Roads, Virginia. It was erected for the defense of the Norfolk navy yard on the Virginian coast, and occupies the site of Point Comfort. The plan and construction were under a French engineer, and during the Civil War it formed an important Confederate stronghold. It covers eighty acres, has within it detached buildings for workshops, barracks, officers' quarters, storehouses, arsenal, and artillery schools, and cost $2,850,000. When in the best condition, it was surrounded by a wet ditch and had extensive breastworks and batteries.

FORT SCOTT, a city in Kansas, county seat of Bourbon county, and one of the important cities of that state. Its site is on a high plateau 800 feet above sea-level, on the Marmaton River, about ninety miles south of Kansas City. The surrounding country is fertile and contains valuable deposits of cement rock, flagstone, and bituminous coal. Several trunk railway lines connect it with the important cities of the central west, and furnish ample means for transporting cereals and manufactures. A fine system of street lighting, electric railways, a public park, and a city library are among the facilities. The public buildings include a United States courthouse and postoffice, a high school, and a normal college. The latter has an attendance of 750 students. There are manufactures of woolen goods, beet sugar, cigars, clothing, flour, machinery, soap, vehicles, and sorghum. Population, 1900, 10,322.

FORT SMITH, a city in Arkansas, county seat of Sebastian county, on the Arkansas River, about 130 miles northwest of Little Rock. It is an important manufacturing center, has a United States custom house, excellent schools, and is well connected by numerous railroads. The title to a military reservation near the city was transferred to it by congress for school purposes. It has a value of $800,000. The manufactures include cotton seed oil, cigars, furniture, ice, cotton goods, and machinery. It is the seat of the United States district court having criminal jurisdiction of Indian Territory. There are many fine residences and business houses. Electric lights, rapid transit, pavements, and waterworks are among the improvements. Population, 1900, 11,587.

FORT SUMTER, a fortification situated at the entrance to Charleston harbor, South Carolina, and named after Thomas Sumter, a patriot in the Revolutionary War. South Carolina seceded in December, 1860, and Major Anderson, the commanding officer, abandoned the adjacent forts and occupied

Fort Sumter with one hundred men and fifty-two light guns. General Beauregard led an attack on the fort April 12, 1861, and two days later it was compelled to surrender. This event was the beginning of the Civil War, and the news of it immediately spread the fire of enthusiasm over the entire north and brought that section to arms. The Confederates held the fort until after the evacuation of Charleston, but surrendered it on April 14, 1865, four years after its capture. Soon after the loss of Fort Sumter to the Confederates, Richmond was evacuated, the Confederate forces surrendered and their cause was entirely abandoned.

FORTUNA (fôr-tū'nȧ), the Roman goddess of chance, called Tyche by the Greeks. She personified the combination of circumstances which we call luck or fortune. It was supposed that she smiled at the birth of the successful, and frowned on those whose efforts resulted in failure. Temples were built to her at Corinth, Smyrna, and Elis, and statues at Antium. In her temple at Thebes she is represented holding the infant Plutus in her arms to symbolize her power over riches and prosperity. According to a Roman legend, she put off her wings and shoes, and threw away her rudder when entering the capital, as an indication that she meant to dwell in the Eternal City forever.

FORTUNY y CARBO (for-too'nee e kär-bō'), **Mariano,** celebrated painter, born in Reus, Catalonia, Spain, June 11, 1838; died in Rome, Nov. 21, 1874. His careful work at the Academy of Barcelona secured a prize and permitted him to pursue further study in Rome in 1858. Shortly after he accompanied the expedition sent by Spain against Morocco, which enabled him to study life in North Africa. After returning to Europe, he produced numerous original scenes from real life on canvas, and in 1866 went to Paris and Berlin, where he introduced his productions to the world of art. Three years later he returned to Madrid and married a daughter of the director of the Royal Museum, and in 1870 settled at Granada. In 1872 he removed to Rome, where he resided until his death. Besides his extensive and valuable paintings in oil, he produced numerous productions in etching and in water colors. Among his best known pictures are "Amateur of Prints;" "Book Lovers in the Library of Richelieu;" "Sword Sharpener;" "Fantasia Morocco," and "Spanish Marriage." The last painting was suggested by the occasion of his own wedding.

FORT WAYNE (wān), an important city of Indiana, in Allen county, on the Maumee River and the Wabash and Erie Canal, about 150 miles southeast of Chicago. It is one of the principal cities of the state, both in population and manufacturing importance. Its annual manufactured products are valued at $9,500,000, and the average number of persons employed is 6,200. Among the chief manufactures are agricultural implements, furniture, steam engines, car wheels, electrical apparatus, leather, stoves, woolen goods, and hardware. There are excellent public school buildings, which are supplied with modern apparatus and a library of 7,000 volumes. It is the seat of a Roman Catholic academy, a state asylum, and a school for feeble-minded youths. The school has facilities sufficient to accommodate 1,000 pupils. Its public buildings include a fine county courthouse. The surrounding country is agricultural, and yields an abundance of hardwood timber for manufacturing. Among the municipal facilities are an extensive electric car system, waterworks, pavements, sewerage, and a number of public parks and libraries. The city is connected by numerous railroads. It is the seat of the Fort Wayne College and Concord College, and maintains numerous educational associations. Population, 1900, 45,115.

FORT WORTH, a city of Texas, in Tarrant county, at the junction of the Trinity, Clear, and West rivers, about 170 miles north of Austin. It is one of the most important railroad centers of the state, and is surrounded by a rich agricultural country producing cereals, cotton, and fruits. The Clear River and numerous artesian wells furnish an ample supply of water for manufacturing and sanitary purposes. An extensive street railway system penetrates all parts of the city, while electric lighting, waterworks, public libraries, and an excellent school system are among the general facilities. It is the seat of the Natatorium, a bathing establishment costing $50,000. Among its educational institutions are the Fort Worth University and a Roman Catholic academy. The city hall, courthouse, high school, and chamber of commerce building are convenient and costly edifices. There are manufactures of wire, flour, hardware, jute, clothing, cotton and woolen goods, leather, and machinery. The manufactories represent a capital of $3,800,000 and give employment to 2,750 men. Its jobbing trade, educational influence, and industrial activity are alike important and progressive. Population, 1900, 26,688.

FORUM (fō'rŭm), in Roman history, a public place or square in a city where markets and public assemblies were held, and where justice was administered. The most noted in Rome was the Forum Romanum, situated between the Palatine Mount and the Capitoline Hill, which was adorned with exquisite statuary and magnificent buildings, and beautified by foliage, flowers, and walks. The government of Italy has recently made excavations and is preserving the more valuable relics for study. Legally, the term forum implies a court where an action may be instituted.

FOSSILS (fŏs'sĭls), the organic bodies that were buried in past ages by deposits of earth, and which preserved their form or substance so as to be capable of identifica-

tion. The term is also applied to indentations made by animals on rocks while forming, as the imprints of birds walking on pasty deposits. Some fossils consist of vegetable and animal parts in a good state of preservation, as the trunks of trees or the bones, teeth, and horns of animals, and the shells of mullusks. The process of fossilization is due to the decomposition of the least permanent in the organic structure and its replacement with some mineral matter. In some cases new material is substituted for the entire decomposed mass, while in others the organic remains are preserved in an almost perfect state. Shells, wood, and other substances are frequently changed into a siliceous fossils by subjecting the organism to the action of water containing silica in solution. Similar results take place when the mineral matter is iron oxide, pyrite, or calcium carbonate, while in rare cases barite and fluorite have a like effect. When the organic portions pass away in decay, the mineral matters slowly take their place.

Fossil footprints of extinct animals have been discovered in the triassic and carboniferous rocks of Eurasia, and in the Cambrian, Silurian, and carboniferous of America. The imprints are largely those of birds, reptiles, mollusks, fish, and insects, and were made either by the feet in walking or by the body making impressions in the mud after death. Fossil botany now includes many extinct plants, among them those of the Dakota group of cretaceous deposits, found in America; those of the Fayette formation, and those of the Florissant, found in Colorado, each of these including a large number of species. Among the recent publications on this subject are F. H. Knowlton's "Catalogue of Cretaceous and Tertiary Plants of North America" and A. C. Seward's "Fossil Plants for Students of Botany and Geology."

FOSTER (fôs'tẹr), **Charles**, statesman, born at Tiffin, Ohio, April 12, 1828. After securing an education, he engaged as a merchant and banker in Fostoria, Ohio. He was elected to congress as a republican in 1870, and subsequently was re-elected three times. While on the ways and means committee, he secured a thorough investigation of the Sanborn frauds and induced the repeal of the Moiety law. In 1874 he investigated certain electoral frauds at New Orleans, and in his official report denounced the acts of both political parties in Louisiana. In 1880-84 he was governor of Ohio, and in the administration of President Harrison was secretary of the treasury, beginning in 1891. He died Jan. 9, 1904.

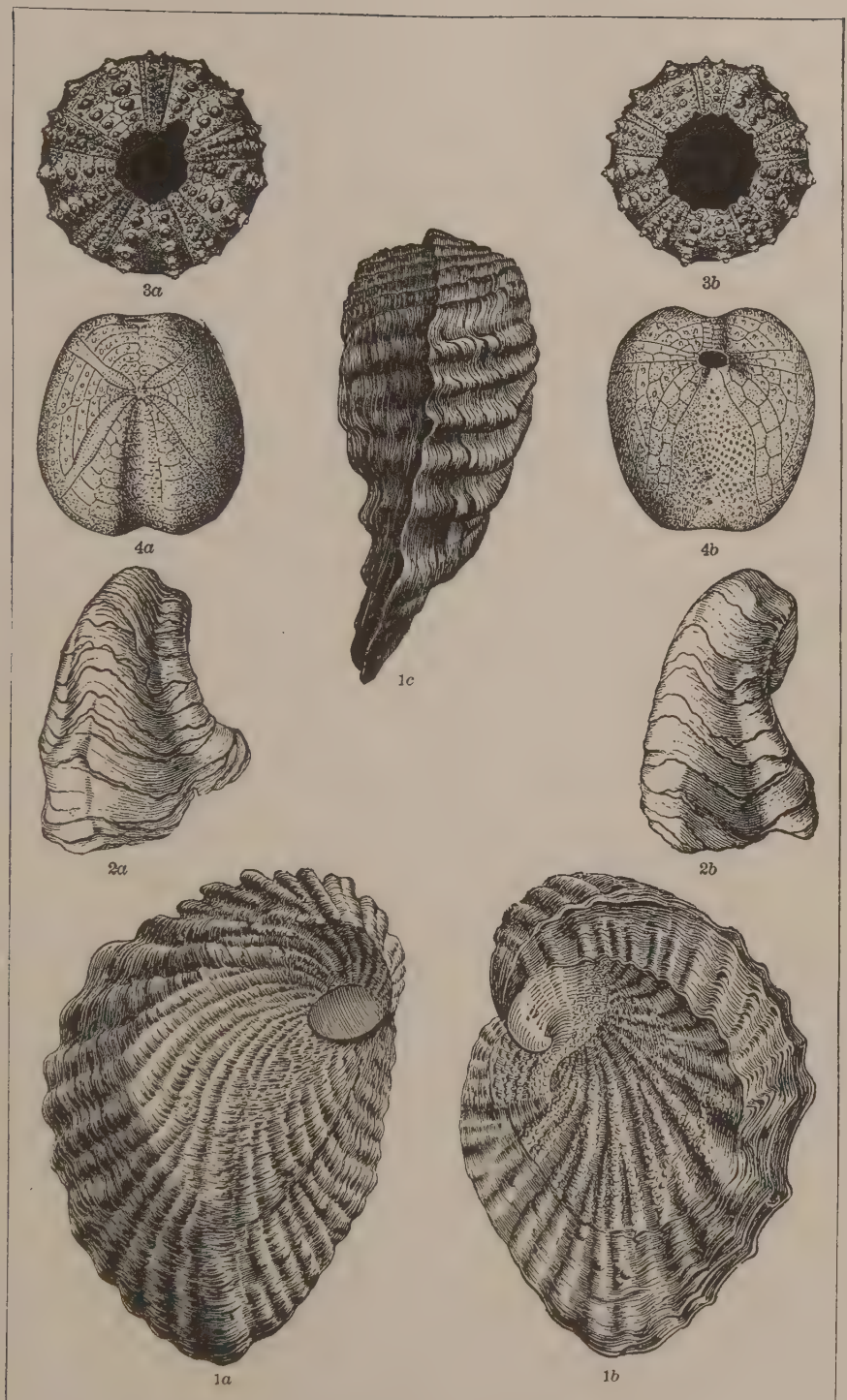
FOSTER, John Watson, statesman, born in Pike county, Indiana, March 2, 1836. He graduated from the State University of Indiana in 1855, studied law at Harvard, and entered upon the practice of law in Evansville, Indiana. Soon after the beginning of the Civil War he entered the service as major. President Grant appointed him minister to Mexico in 1873, and in 1880 he was made minister to Russia. Later he served as minister to Spain. In 1892 he succeeded J. G. Blaine as secretary of state, represented the United States at Geneva in the Bering Sea arbitration in 1893, and in 1895 was selected by the emperor of China to treat with Japan as peace commissioner. He negotiated a treaty with much ability, which was promptly ratified as the treaty of Shimonoseki. In 1898 he was appointed a member of the Anglo-American joint high commission, which was created that year.

FOSTER, Randolph Sinks, Methodist Episcopal bishop, born in Williamsburg, Ohio, Feb. 22, 1820; died May 1, 1903. He was educated at Augusta College, Kentucky, becoming a minister in 1837, and secured a charge in the Kentucky conference. Subsequently he labored in Ohio and New York, and in 1856-58 was president of the Northwestern University in Evanston, Illinois. Later he served as pastor in New York and Sing Sing and became bishop in 1872, making visitations in Europe and several of the South American republics. His publications include "Christian Purity;" "Beyond the Grave;" "Study in Theology;" "Minister for the Times," and "Centenary Thoughts for the Public and Pew of Methodism."

FOSTER, Stephen Collins, song and ballad writer, born in Pittsburg, Penn., July 4, 1826; died at New York, Jan. 13, 1864. He was related by marriage to President Buchanan, possessed a fair knowledge of German and French, and began writing songs at the age of thirteen. He composed 125 popular songs, a large portion being melodies in the Negro dialect. Among the best known are "Sadly to Mine Heart;" "Nelly was a Lady;" "Come Where My Love Lies Dreaming;" "Old Dog Tray;" "Massa's in the Cold Ground;" "Old Kentucky Home," and "Old Folks at Home." His songs became popular from the first and were a source of profit to him, his "Old Folks at Home" bringing him about $15,000.

FOSTORIA (fŏs-tō'rĭ-ạ), a city of Ohio, in Seneca county, about twelve miles west of Tiffin. Being the focus of several railroads, it has a large trade in produce and merchandise. It is surrounded by a rich agricultural and fruit district, contains natural gas wells and has a fine system of public schools. The manufactures include flour, cigars, machinery, glass, and utensils. Gas and electric lights, street railways, waterworks, and excellent school buildings are among the improvements. Population, 1900, 7,730.

FOUCHE (foo-shā'), **Joseph**, duke of Otranto, minister of police under Napoleon I., born near Nantes, France, May 29, 1763; died in Trieste, Austria, Dec. 25, 1820. He was educated in Paris, lectured in the colleges of Juilly, Arras, and Vendome, and subsequently became an advocate. In 1792



FOSSILS COMMON TO CLAYS AND LIMESTONE.

1*a*, 1*b*, 1*c*, Exogyra texana. 2*a*, 2*b*, Gryphæa marcouri. 3*a*, 3*b*, Pseudodiadema texanum.
4*a*, 4*b*, Enallaster texanus.

(opp. 664)

he succeeded in an election to the national convention. He advocated the execution of Louis XVI.; was nominally implicated in the atrocities of the period, and expelled from the national convention in 1794. Later he became ambassador to Milan, then to Holland, but shortly after was recalled to Paris and appointed minister of police. Napoleon dismissed him twice on account of mistrust, but each time renamed him for the place. When the titles of nobility were revived, he was made duke of Otranto. After the fall of Napoleon he was given office by Louis XVIII., but was soon after dismissed and banished with all those who had voted for the death of Louis XVI. Subsequently he settled at Prague, where he became a citizen of Austria.

FOUNTAIN, an artificial basin containing water for drinking or other useful purposes, and connected by an arrangement of pipes through which water is forced to specific heights in ornamental jets. The pressure of the water at the head of the pipes is sufficient to cause it to rise to almost the same height at the orifice of issue. Many of the larger cities maintain elaborate foun-

FOUNTAIN.

tains in public parks and squares for refreshing and ornamental purposes, while very beautiful effects are seen in connection with them at the great expositions. Among the most noted fountains are those at Rome, Berlin, and Paris. Those in Paris are mostly at the Place de la Concorde and at the Tuileries. The fountains seen at the international expositions are beautifully illuminated by electric lights, by means of which it is possible to secure elaborate color effects at night.

FOURIER (fōō-ri-ā′), **Francois Marie Charles**, socialist and founder of Fourierism, born in Besançon, France, April 7, 1772; died in Paris, Oct. 10, 1837. He studied at the place of his birth and later at Rouen and Lyons, where he showed aptitude in music and the sciences. On leaving school he became clerk in a mercantile house. Subsequently he entered business on his own account, but lost his money by reason of military disturbances and an insurrection in Lyons. During his leisure he wrote numerous books on social questions and founded the Fourier socialistic system. According to this system harmony can be brought out of social discord by giving free play to all the feelings and passions of life. It designs to colonize mankind in phalanges, each one a body of about 1,800 persons, divided according to affinities into groups of twenty-four to thirty-two, constituted of persons attracted by one of the four affecting passions—ambition, friendship, love, and familism. Each of these groups should occupy a phalanstere, a highly cultivated self-supporting tract a league square. The members are to have their support from the result of the labors of all, and the residue is to be divided in twelve shares, three to be given as a reward for talent, four to capitalists, and five as a reward for labor. The system was tried in the United States and France and in both instances resulted in failure.

FOUR-O'CLOCK, an ornamental flowering plant native to Peru, but naturalized extensively in all the continents. It is so called because it blooms from about four o'clock in the afternoon till the next morning. There are many varieties of colors. Most species are cultivated extensively in flowering beds and gardens. The calyx is often mistaken for a corolla, from its brilliance and calyx-like involucre.

FOWL, a term formerly used as a synonym of bird, but now restricted more particularly to the genus of birds known as gallus, of which the East India jungle fowl is thought to be the original. The domestic fowl, including the cock and hen, belong to this class. That the domestication of fowls is of great antiquity is attested by figures on Egyptian monuments and the traditions of the Chinese, according to which they received their poultry from western countries as early as 1400 B. C. Among the best known varieties are the Leghorn, Spanish, Hamburg, Cochin, Brahma, Bantam, Plymouth Rock, Langshan, and Dorking. See **Poultry**.

FOX, a genus of animals allied to the dog, having a long, bushy tail, the pupil of the eyes vertically elliptical, and erect ears. In all species the skull is rounded, nose very pointed, and limbs slender. However, they differ in size, color, and weight, but all exhibit the same artifices in obtaining prey and escaping danger. Foxes are so cunning that they are rarely caught in any kind of trap. They burrow in the ground and live on animal food, unless pressed with hunger, when they feed on vegetable substances, especially seeds. The species include the common fox, red fox, gray fox, cross fox, black fox, coal fox, and the Arctic fox. Among the best known American species are the red, gray, cross, and Arctic foxes, which are hunted and trapped for their furs. The Arctic fox is smaller than the common fox,

is pure white in winter, and abounds in the far north of the continent. It is gregarious and much more easily tamed than other

RED FOX.

species. Different varieties are found in America, Eurasia, and Africa, though those common to the high latitudes are almost universally smaller in stature. The fox chase is a favorite sport in many regions. Owing to its cunning, the fox has entered largely as a popular figure into stories and fables.

FOX, the name of two rivers that rise in Wisconsin, though both are also known by other appellations. The Fox, or Pishtaka, has its source in Waukesha county, flows in a southerly direction and joins the Illinois River at Ottawa, Illinois. The Fox, or Neenah, rises in Green Lake county, makes a bold turn toward the west and north, after a tortuous course passes into Lake Winnebago, and thence flows northeast into Green Bay. Its entire course is about 250 miles. Near its headwater it approaches within two miles of the Wisconsin River, with which it is connected by a canal at Portage City, thus providing a union between Lake Michigan and the Mississippi River.

FOX, Charles James, celebrated statesman, born in London, England, Jan. 24, 1749; died Sept. 13, 1806. He was the second son of Henry, first Lord Holland, educated at Eton and Oxford, and elected to parliament for Westminster at the age of nineteen. In his legislative policy he supported Lord North, became admiralty lord, and in 1782 obtained the office of secretary of state for foreign affairs. In the rivalry between Burke and Pitt he sided with the former, and opposed the British coercive policy in dealing with the American colonies prior to and during the Revolution. His career as a statesman was distinguished by brilliant oratory and marked regard for the interest of colonial possessions. He ranked as a speaker with Burke, Sheridan, and Pitt. His remains were buried in Westminster Abbey.

FOX, George, founder of the society of Friends, born at Drayton, Leicestershire, England, in July, 1624; died Jan. 13, 1691. His religious work began at the age of nineteen, when he took the Bible for his creed and traveled throughout many portions of Britain, holding meetings and preaching the gospel. Besides opposing all superfluous religious ceremony, he refused to remove his hat for any one, and addressed both men and women by using the pronouns thee and thou. While the sincerity of his teaching was admitted, he was persecuted and placed under arrest at various times. In 1677 he accompanied Penn and Barclay to Germany and Holland, and also visited the American continent. From the trembling mode of delivery in preaching and the frequency with which he admonished the rulers to call upon the Lord in fear and trembling, his followers became known as Quakers, the term being first applied at Derby, England. He wrote numerous works relating to his doctrines.

FOXHOUND, one of several breeds of dogs possessing marked value in fox-hunting. It is noted for its fleetness, perseverance, physical strength, and fine scent. Its average height is twenty-one inches. The foxhound is supposed to be a cross between the staghound and the bloodhound.

FOX INDIANS, a tribe of North American Indians belonging to the Algonquin family. Formerly it occupied portions of Iowa, Nebraska, and Kansas, but now only few remnants remain in these states and in Indian Territory. Many of these Indians are industrious and progressive, having acquired both educational advancement and financial stability.

FOXTAIL GRASS, the name applied to several grasses with brush-like spikes resembling the tail of a fox. Several species abound in meadows and pastures. They possess nutritive qualities, though some varieties, from their hardy nature and remarkable tendency to multiply, are obnoxious weeds in cultivated lands. A number of species are naturalized in the United States and cultivated as forage plants.

FOX TERRIER, a small dog useful in following the fox to its habitation. The weight is about eighteen pounds. Its spirit is keen and lively, and it is adapted in every way for companionship and service in the hunt.

FRANCE, a populous and influential country of western Europe. Its northern boundary is formed by the English Channel and the Strait of Dover; eastern by Belgium, Germany, Switzerland, and Italy; southern by the Mediterranean Sea and Spain; and western by the Atlantic Ocean and the Bay of Biscay. Its greatest breadth from east to west is 552 miles, and its length from north to south 605 miles. The numerous coast indentations afford many good harbors, thus rendering the country capable of supporting an extensive maritime system. Numerous islands abound on the northwestern shore, the largest of which are Re, Belle Isle, and Oleron. The total area is 204,095 square miles, and the population 38,825,890, exclu-

AMERICAN GRAY FOX.
(Urocyon Cinereo-argenteus).
♂ Life-size.

sive of Algeria and the colonies. The colonial possessions, dependencies, and protectorates of France have an area of 3,617,850 square miles, and an estimated population of 53,750,000. More than a million of the inhabitants of France proper are foreigners, mostly of European birth, while the rate of increase in population is very small, but there is a small preponderance of births over deaths. However, the increase of the last several decades may be attributed to immigration. The three chief religious denominations are Roman Catholic, Protestant, and Jewish in the order named. Religious worship is free, though any sect having 100,000 adherents secures annual grants of state money, which, based on numbers, is given almost exclusively to the Roman Catholic. Twelve cities have a population of more than 100,000. Paris is the third city of Europe, being exceeded in population only by London and Berlin, and is the capital of France. The other cities of importance include Lyons, Marseilles, Bordeaux, Lille, Toulouse, Nantes, St. Etienne, Havre, Rheims, Roubaix, Rouen, Rennes.

The eastern portion of France is traversed by numerous mountain chains, of which the Pyrenees, Cevennes, and Vosges are the most prominent. These mountain ranges form the principal watershed, the rivers flowing from them to the west and north toward the Atlantic, and on the opposite side to the south and east into the Mediterranean. The most lofty peak of the Pyrenees within French territory is Vignemale, 10,792 feet high, while Mont Blanc, height 15,781 feet, of the Alps is largely in France. The interior of France is marked by several volcanic groups known by the general name Auvergne, while the coast region along the English Channel is largely level and exceedingly productive. Many important river basins are formed by the foothills and mountains, through which flow numerous navigable streams, the entire number capable of navigation being about 200, and the entire length of interior navigation about 6,000 miles. Among the principal rivers are the Rhone, Saone, Isere, and Durance, in the southwestern part; and the Garonne, Charente, Loire, Dordogne, Seine, and Somme, in the western; most of the latter drain directly into the Atlantic. The geological formations are largely granite, trachytes, and basalt. In the Jura Mountains are enormous limestone masses known as Jurassic. As a whole the climate is favorable and among the most healthful in Europe. The isothermal lines of France indicate a normal temperature of about 50°. The regions in the southeast are the warmest, and those in the northwest the coldest, though all portions, except the most elevated mountain regions, are susceptible to profitable cultivation of cereals, vegetables, and fruits, and are marked by atmospheric brightness and salubrity.

The industries of France are largely manufacturing and agriculture, though mining is carried on in several portions, particularly in the vicinity of Valenciennes. The chief mineral product is coal, which aggregates a large volume annually, though it is not adequate to supply the increasing demand for fuel in manufacturing. Besides coal, there are also extensive productions of iron, salt, lignite, limestone, zinc, copper, lead, and manganese. There are extensive manufactures of textiles, but silk takes rank as the most important, and is most largely represented at Lyons. The production of silk goods constitutes in value more than one-fourth of the manufactured products of France, and employs about 2,000,000 persons. However, there are also extensive productions of cotton and woolen goods, muslins, lace, porcelain, earthenware, scientific instruments, engines, machinery, and sailing vessels. On the Atlantic and Mediterranean coasts are numerous productive fisheries, furnishing large quantities of cod, oyster, herring, salmon, turbot, and mackerel.

The annual production of wine is about 715,000,000 gallons, and in this France outranks all other European countries. It also takes first rank among the states of Europe in the yield of wheat, which equals one-seventh of the world's supply, aggregating annually about 350,500,000 bushels. Other cereals extensively produced are buckwheat, corn, rye, barley, and oats. The sugar beet industry has developed greatly within recent years, and led to the production of large quantities of sugar. Vegetables are produced in all portions of France, while fruits abound extensively, though they grow most successfully in the sourthern portion, where the peach, pear, orange, lemon, fig, and citron thrive. The adaptable condition of the soil for the production of forage crops has caused France to rank as a leading country in the production of cattle, sheep, horses, and goats. Dairying is an important industry, which in many regions is associated more or less with the production of swine. The culture of silkworms is receiving marked attention in the warm portions, where it is fostered on a large scale. Tobacco culture abounds extensively, and vineyards thrive on vast areas, about one twenty-fifth of the whole surface being planted to vines. Fully one-half of the entire area of France is under plow, and nine-tenths is productive in plant growth. Native forests are under the protection of the government, and still yield valuable quantities of construction timber, including oak, beech, elm, poplar, cedar, cork oak, and willow.

Extensive railroad and canal facilities make it possible to carry on a vast commerce, and bring the interior products for shipment to the principal seaports. The railways are largely under direct government supervision, rank among the superior of

Europe, and penetrate all portions of the country. Canals connect the various river basins and facilitate transportation to the Atlantic Ocean, the North Sea, and the Mediterranean. The total length of canals is 3,200 miles, the most important of which are the canal of Languedoc, which connects the Garonne with the Mediterranean; the Rhone and Rhine canal, and the canal of Bourgogne. Telegraph and telephone lines are everywhere manifest and efficiently managed, and, like the canals and railroads, are largely under direct government supervision and ownership. There is an extensive foreign commerce, though it is carried on largely by foreign ships. The number of vessels in the merchants' navy of France is 15,000, carrying two tons and upwards, while the larger steamers number about 1,000. Among the principal seaports are Havre, Rouen, Dunkirk, Boulogne, Marseilles, Bordeaux, Nantes, Dieppe, and Calais.

The government of France is a constitutional republic, in which three departments of government are recognized, and dates from Sept. 4, 1870, when the second empire was overthrown as a direct result of the Franco-German War. Its legislative authority is vested in two chambers: the chamber of deputies and the senate; representation in the former is elective and in the latter appointive by officials of the departments. In the chamber of deputies are 584 members, chosen for four years, and the senate is composed of 300 members. The entire country is divided into eighty-seven departments. Each of these is divided for election purposes into arrondissements, and these again into smaller divisions for the purpose of local government. The system of justice is like that of the United States, originates in inferior courts, and, after passing through courts of appeals, terminates in the supreme court of the state, which has its seat at the capital. The president is elected for a term of seven years by the two chambers, a majority of both bodies being necessary to a choice. He has the appointment of civil and military posts, and is assisted by ministers whom he appoints.

Educationally France occupies a high position among the countries of southwestern Europe. The minister of public instruction and fine arts has supervision of all the branches of education, and is assisted by an educational council. Primary, secondary, and high schools are maintained under appropriate courses of study, while they are supplemented by colleges and universities devoted to industrial art, law, theology, literature, and medicine. In the capital of each department and some other cities are higher institutions of learning, the whole number being about 275. Military service is obligatory on every Frenchman from the age of twenty to forty-five years, who is not declared unfit for military duty. The present peace footing is 575,000 men and officers, though the entire war strength, including the colonies, aggregates 2,700,000 men. The principal sources of revenue are land taxes, registration, customs and excises, railroads and telegraphs, and licenses. The total national debt is larger than that of any country in the world, being about $6,800,000,000, and the revenue and expenditures are correspondingly large.

Julius Cæsar, who wrote regarding his invasion and conquest in 59 B. C., furnishes the first authentic history of France. The Roman name was Gallia, while the early English was Gaul, and the people were largely Celtic in race, though other settlements were maintained, especially by the Aquitani and Belgæ, with here and there tribes of Germans and Greeks. At that early period it contained parts of Switzerland, Germany, and Belgium, as well as the whole of France. The name France was derived from the Franks, a Germanic tribe that made settlements in Gaul after the decline of the Roman Empire. By the 2d century A. D. it was Romanized in civilization, language, and religion, while settlements flourished and the population increased rapidly. Gradually agriculture and manufacture took the place of the simpler arts of the semi-savage people. The Franks by the end of the 5th century made themselves masters of nearly all France, and conquered adjacent territory east of the Rhine. In 481 Clovis, a descendant from Merovig, established the first dynasty, called the Merovingian, with his capital at Paris, and reigned until his death in 511, when his kingdom became divided among his four sons. The country was subsequently divided among other rulers under a general law of inheritance, by which numerous principalities rose. The last of the first dynasty terminated in 752, when the Carlovingian arose, its greatest representative being Charlemagne, who was the second ruler. At that time there was no real kingdom of France, for the reason that the first dynasty was Germanic, and Charlemagne founded a German rather then a French empire.

The true founder of the French monarchy was Hugh Capet, who established the Capetian dynasty in 987, and added the fiefs of Orleans and Paris to the monarchy. For two centuries the Capetian dynasty endeavored to reconquer former prerogatives from vassals, and also strained its powers in resisting English pretensions to the crown of France. The first branch of Capetian kings became extinct with the death of Charles IV., in 1328, for the reason that the Salic law excluded female succession. At that time the crown passed to Philip of Valois, who ascended the throne as Philip VI., which led to a series of wars with England on account of the claims made by Edward III. to the throne, and these continued for 125 years. The most important battles occurred at Crecy in 1346, Poitiers in 1356, and Agincourt

in 1415; which all resulted more or less favorably to England, and gave that country many of the best provinces, while the treaty of Troyes, drawn shortly after the battle of Agincourt, recognized the succession of Edward III. to the crown of France. The animation of the French, due to the noble deeds of Joan of Arc between 1429 and 1431, caused a complete change and drove the English from the country, the only possession remaining to them being Calais.

Louis IV. laid the foundation of a great monarchy in 1461, largely restored internal peace, and brought back a feeling of nationalism. The Valois-Orleans branch of the Valois line succeeded to the throne in 1498, but in 1515 the crown reverted to another branch of the house of Valois in the person of Francis I. This sovereign carried forward the attempts to conquer Italy begun by previous monarchs, and became involved in five great wars with Germany, which terminated in the loss of some prestige and the transfer of Savoy and Piedmont by the treaty of Cateau-Cambresis, though this loss was at least partly balanced by securing Calais, the last possession of the English in France. Francis II. reigned only in 1559-60, but during this brief time the Catholic house of Guise attained power, while the opposing movements for the reforms were led by the house of Bourbon. The religious wars of this epoch shed much blood of the French, during which period also occurred the massacre of Saint Bartholomew, and the great national debt that weighed upon France more than two centuries was also fastened upon the commonwealth. The religious wars terminated only when Henry IV., previously king of Navarre, went over to the Catholic Church from the leadership of the Huguenots.

Louis XIII. succeeded to the throne in 1610, inaugurated a new policy by siding with Richelieu, a Protestant prince, in a reformation. At his death in 1643, Louis XIV. began a memorable reign, which was marked by a still more vigorous policy and led to the highest power and widest influence attained by the French monarchy. Under his wise direction French literature, art, and science developed to a higher plane than before known, education flourished, and the borders of France were extended to the Rhine. The efficient services of the military engineer, Sebastien Vauban (1633-1707), strengthened French fortifications, while its ministers secured advantageous commercial treaties. Louis XV. added Corsica and Lorraine to France by the treaty of Paris. However, in 1763 French colonies were largely ceded to England on account of misfortunes in war.

The weakness of Louis XVI., the success of the American Revolution, and the great spirit of unrest that marked the closing of the 18th century led to the revolution of 1789. War raged with all its horrors and cast an unfortunate people into a great sea of bloodshed, which finally led to the execution of Louis XVI., in January, 1793. This was followed by a treaty of peace and the general amnesty of 1795. The French Republic was recognized by the treaty of Basel in the same year, while a new constitution was formulated by the convention, which finally dissolved in October. The scheme of government provided a chamber of 500 to propose laws, the chamber of ancients to approve them, and the executive of five members called the directory. Napoleon Bonaparte soon became the most prominent man in France. His successes led to the overthrow of the directory and the establishment of the consulate, himself being appointed first consul for a term of ten years. The brilliant victory won on the battlefield of Marengo and the extension of France to the Rhine led to the proclamation in 1804, by which he became emperor, and was soon after confirmed by a popular vote of the people. Pope Pius VII. consecrated Napoleon emperor at Paris, and crowned him king of Italy in 1805. Though an extensive coalition was formed by European powers, they were unable to check his career and France became the greatest power of Europe. The great battle of Austerlitz in 1805 caused the king of Naples to be dethroned, Holland became a vassal kingdom, and Prussia was humiliated. At that time the kingdom set up by Napoleon extended from Naples to Denmark and the capitals were Amsterdam, Paris, and Rome. The Russian invasion of 1812 cost France 300,000 men, but the allied forces were defeated in the battle of Leipsic in 1813. In 1814 the allied armies entered Paris, Napoleon abdicated and retired to Elba as a mere prince. Louis XVIII. became king of France and concluded the peace of Paris, but was soon driven from power by the return of Napoleon, who assumed authority without resistance. The allied powers reorganized, brought on his final defeat at Waterloo in 1815, and sent him a prisoner to St. Helena.

The long line of French kings ended with Louis Philippe, who was driven into exile by the revolution of 1848, and a republic was proclaimed with Louis Napoleon as the president. By a vote of the people he was made emperor in 1851, with the title of Napoleon III. The growing discontent of the people led him to declare war against Germany in 1870, which witnessed a disastrous loss to the French army upon every battlefield, and the empire ended with the capture of Napoleon and 83,000 men at Sedan. As a war indemnity France was required to cede Alsace and a part of Lorraine to Germany and pay $1,000,000,000 in gold. Civil war broke out in Paris under the leadership of the Commune, which was put down with difficulty. The second republic was then organized, and M. Thiers became the first president. With the overthrow of the administration in 1873 came the election of

Marshal MacMahon, who resigned the presidency in 1879, and was succeeded by Jules Grévy. The latter was followed in the presidency by Sadi Carnot in 1887. After the assassination of Carnot in 1894, Jean Casimir-Périer succeeded to the presidency, and, when the latter resigned in 1895, Felix Faure attained the election. President Faure died on Feb. 16, 1899, and was succeeded by M. Loubet, who was elected by 483 votes as against 279 cast for M. Meline. The present republic has enjoyed a long era of prosperity, an epoch in which France has become the seat of great expositions, fine scientific institutions, and has taken a high rank in the arts of peace.

Before the Romans occupied Gaul, Celtic was the chief dialect spoken in the region now occupied by France, and that language is still spoken in Brittany. The French language is classed with the Romanic group, of which it is the most important dialect, the other languages of this group being the Spanish, Italian, Portuguese, Provencal, and the Wallachian or Romanic. After Roman occupation the Gallic, Celtic, and other local dialects gradually became modified by the introduction of new elements, and by the 8th century a marked distinction existed between the popular language of France and the classic Latin. They were distinguished by the names Romana and Latina, and, when the new Romance tongue became generally adopted, it was named French. Louis the German in 842 took an oath in the Romance tongue in Strasburg, and this is regarded the oldest written document in that dialect extant. Francis I. prohibited the use of Latin at court in the beginning of the 16th century, since which time French has been recognized as the national language. It has been the language of diplomacy, cookery, fine art, and the European aristocracy since the Middle French period. Its greatest popularity was attained in the Napoleonic reign, though it is now the language of about 50,000,000 people, and its literature is exceptionally rich.

The literature of France is both extensive and valuable, embracing many products of a large number of eminent writers. It may be said to begin with the 11th century, when numerous poems were collected and published. These poems embrace at least three classes, including those that relate to the achievements of Charlemagne and his descendants; those relating to ancient history, particularly Alexander the Great, and those detailing the life and achievements of King Arthur. Philippe de Comines (1445-1509) is one of the first historians of eminence, dealing with the life and times of Louis XI. and his contemporaries, but the writings of Froissart (1337-1410), which include a collection of poems and tales of the chivalry of the 14th century, are perhaps the most popular productions of the early period. French literature was greatly modified by the revival of classical learning, when public thought was directed to classical study and sacred history. The humorist Rabelais (1483-1553) belongs to the same period, as also does the essayist Montaigne (1533-92). In that period the great theological work of John Calvin, entitled "Institution of the Christian Religion," exercised a wide influence, and was the cause of inducing many writers to turn with renewed vigor to works in prose. Clément Marot (1495-1544) wrote numerous witty poetic productions, while Margaret of Navarre issued popular tales, and Jodelle (1532-73) gave an impetus to tragedy.

With the advent of Louis XIV. came the golden age of French literature. At that time Pierre Corneille (1606-84) wrote his masterpieces, entitled "Horace," "Cid," "Cinna," and "Polyeucte;" Pascal (1623-62) created interest by his "Provencal Letters," and Racine (1639-99) wrote his "Iphigenie Phedre," "Athalie," and other noted comedies for the stage. Fine works in prose were also added to the general writings by Jean Louis Balzac (1594-1654) and Voiture (1598-1648), while Descartes produced works of high philosophical value. Molière wrote his familiar plays, "School of Women," "Misanthrope," and "Tartufe," and elegant sermons were added to French literature by Massillon, Bossuet, and Bourdaloue. Other writers of the 17th century include the historians, Cardinal de Retz and Madame de Sévigné; the biographical writers, St. Evremond and La Rochefoucauld, and the miscellaneous writers, Le Sage and Bernard Fontenelle (1657-1757).

Many works of philosophical value were added to the literature in the 18th century, but that period also produced much of value in other essential lines. Voltaire not only wrote valuable works in philosophy, but also holds a high place as a historian, dramatist, and poet, and for more than half a century stood at the head of French letters. The satirist, Montesquieu, is the author of "Persian Letters" and of many historical and general works, including "Spirit of the Laws." As a writer of elegant style and profound thought Rousseau stands next to Voltaire, his chief works being "Nouvelle Heloise" and "Confessions," while his "Social Contract" and "Emile" continue to exercise a wide influence in education and politics. The "Encyclopædie," an extensive review of general subjects, though quite hostile to religion, was published by Diderot and D'Alembert. Other works of importance include Prevost's "Manon Lescaut," St. Pierre's "Paul and Virginia," Beaumarchais' "Barber of Seville," and Buffon's "Natural History." Helvetius, La Mettrie, Condorcet, and Condillac may be mentioned as other writers of note.

There was a considerable multiplication of writers in the 19th century, owing largely to the brilliant achievements of Napoleon

and the general establishment of schools and institutions of higher learning. In that period rose the so-called Romantic School, of which Victor Hugo, Alfred de Vigny, and Alexandre Dumas are leading representatives. "Les Miserables" is the masterpiece of Hugo, while "Cinq-Mars" is the best novel from the pen of De Vigny, and "Three Guardsmen" and "Count of Monte Cristo" are popular works by Dumas. Among the novelists of eminence are Honoré de Balzac, who belongs to the so-called realistic school, George Sand, Eugene Sue, Gustave Flaubert, Victorien Sardou, and Octave Feuillet. Jules Simon, Bastiat, and De Tocqueville rank among the eminent writers on political economy; Guizot, Thiers, Victor Duruy, and Henri Martin among the historians; Victor Cousin, Auguste Comte, and Lamennais among the philosophical writers, and Cuvier and St. Hilaire among the scientific writers. Stanislas Julien and Burnouf added much of value to Oriental knowledge; Leconte de Lisle, Gautier, and Theodore Aubanel to poetry, and among the essayists and literary critics are Gustave Planche, Théophile Gautier, and Paul de St. Victor. The beginning of the 20th century witnessed unusual activity in French literature, and there are promises that the productions will excel in number and value those of the previous period. Among the eminent historians are Ernest Lavisse and M. Rambaud; among the poets, Henri de Régnier and M. Gregh; among the critics, M. Renouvier and Edgar Quinet, and among the general writers, Émile Zola, Marcel Monnier, Alphonse Daudet, Emile Faguet, and Frederick Masson.

FRANCIS I., king of France, born in Cognac, France, Sept. 12, 1494; died March 31, 1547. He was a student of science and chivalric literature, married the daughter of Louis XII., and succeeded him as king on Jan. 1, 1515. Shortly after ascending the throne, he sent a force against Milan with the intention of annexing it to his dominion. His advance was opposed by the allied armies of Henry VIII. and Charles V., who had formed an alliance with the pope, expelled his forces from Italy, and shortly after invaded northern France. In 1525 he was taken prisoner at the battle of Pavia, kept in confinement at Madrid for a year, and given his freedom on the expressed condition of surrendering all claims to his Italian possessions, Artois, Flanders, and the duchy of Burgundy. Since Charles V. of Spain was a rival candidate for the imperial crown of Germany, the war between him and Francis I. continued, but was finally terminated in 1544 by the treaty of Crespy. Within his reign the revival of learning greatly influenced France, the Protestant Reformation had its beginning, and the power of the monarchy was strengthened. Learning and art rose under his policy of inviting scholars and painters to the cities, while he fostered the building of highways, palaces, libraries, and institutions of higher education. His character was marked by a gay and amiable disposition, heroic impulses, and acts of liberality. However, his policy of persecution actively conducted against the Vaudois placed him in an unenviable light.

FRANCIS II., king of France, eldest son of Henry II. and of Catherine de Medici, born in Fontainebleau, Jan. 19, 1543; died Dec. 5, 1560. He married Mary Stuart, daughter of James V. of Scotland, afterward queen of Scotland, in 1558, and ascended the throne of France on July 10, 1559. He was then a sickly boy of about sixteen years. The government was under the influence of the duke of Guise and the country was disturbed by civil contentions during his brief reign.

FRANCIS I., emperor of Germany, born Dec. 8, 1708; died at Innsbruck, Aug. 18, 1765. He was the son of Leopold, duke of Lorraine; married Maria Theresa, daughter of Charles VI., in 1737, and was crowned emperor on Oct. 4, 1745, as successor to Charles VII. His administration was disturbed by a long war against Frederick the Great, known as the Seven Years' War, in which Austria and Prussia contended for supremacy. He was succeeded in Germany by his son, Joseph II., under the regency of his mother, and in Tuscany by his younger son, who afterward became Leopold II.

FRANCIS II., emperor of Germany, and I. of Austria, eldest son of Leopold II., grand duke of Tuscany, born in Florence, Italy, Feb. 12, 1768; died March 2, 1835. His father became emperor of Austria in 1790 by the death of his brother, Joseph, and two years later the crown devolved upon Francis. The French revolution was fast organizing and exciting alarm among the dynasties of Europe, which induced Francis to conclude an alliance with Prussia against the new republic, and, after a series of hostilities, the peace of Campo Formio was concluded in 1797. He formed a new alliance with Russia and England in 1799 with a view of humbling the pride of France. At first the allies were successful in Italy, Germany, and Switzerland, but, after the return of Napoleon from Africa, Austrian power was paralyzed by the French victories at Hohenlinden and Marengo, and resulted in Francis ceding the left bank of the Rhine to France. When France was declared an empire in 1804, Francis assumed the title of hereditary emperor of Austria. The following year hostilities were renewed between Austria and France, but the great battle of Austerlitz terminated in the peace of Presburg by which Francis surrendered Tyrol and the Venetian states. By this treaty the German Empire, which had prevailed about 1,000 years, was dissolved, and Francis assumed the title of emperor of Austria and king of Bohemia and Hungary. In 1809 Francis again became a leader in the war

against France and secured a victory at Aspern, but Napoleon soon after occupied Vienna and dictated terms of peace, the chief condition of which required Francis to surrender 42,000 square miles of territory. History accords him a place among the extreme absolutists in politics, an advocate of centralization of administrative powers. He labored indefatigably for the welfare of the people, encouraged education, built canals and highways, introduced manufactures, and sought to solidify the German states. However, his designs were frustrated by the extreme unrest and excitement of the Napoleonic wars.

FRANCIS, David Roland, statesman, born in Richmond, Kentucky, in October, 1850. He graduated, in 1870, from Washington University at St. Louis, and shortly after engaged in the grain and commercial business. In 1884 he was elected president of the merchants' exchange, attended the national democratic convention at Chicago as delegate-at-large, and in 1885 was elected mayor of St. Louis. He was elected governor of Missouri in 1888, and in 1896 he succeeded Hoke Smith as secretary of the interior under appointment of President Cleveland.

FRANCIS, St., celebrated saint of the Roman Catholic Church, founder of the order of Franciscans, born in Assisi in 1182; died Oct. 4, 1226. His early youth was marked by a disposition of innocent gaiety. He secured a liberal training and devoted his life to religious culture. In 1209 he founded an order of mendicants, though he had but two followers, and devised rules for the guidance and instruction for those whom he taught. Its teaching and example were those of one devoted strictly to compliance with the injunction to preach the gospel to all people, to do the greatest possible good, and to let each day care for itself. Pope Innocent III. approved the order in 1210, and two years later the church Sta. Maria degli Angeli was set apart for the occupation of its members. The effects of his work extended so rapidly that it was possible to hold a general assembly with 5,000 members in 1219, at which a better understanding and greater inspiration were obtained. The sultan of Turkey granted the Franciscans the guardianship of the Church of the Holy Sepulcher in Palestine, which is still in their charge. St. Francis was canonized by Gregory IX. in 1228. In the 18th century the Franciscans, according to Helyot's "History of Religious Orders," included 120,000 friars and 30,000 nuns, and it is still one of the largest of Roman Catholic orders. They were an important factor in the revival of art, organized many religious institutions, and counted among their membership many historians, bishops, and cardinals. The popes belonging to the Franciscans include Nicholas IV., Alexander V., Sixtus IV., Sixtus V., and Clement XIV.

FRANCIS JOSEPH I., emperor of Austria and king of Hungary, nephew of Emperor Ferdinand I., born Aug. 18, 1830, became emperor of Austria on Dec. 2, 1848, and king of Hungary on June 8, 1867. He was educated in the best schools of Austria and learned to speak the various languages and dialects spoken in the Austro-Hungarian dominion. He married Princess Elizabeth, daughter of Duke Maximilian Joseph, in 1854. A constitutional monarchy was promised before ascending the throne, but he assumed absolute power by dissolving the national assembly, which resulted in a rebellion led by Hungary. These disturbances were put down with the assistance of Russia. National ties were strengthened by measures designed to extend educational arts, reform the civil service, and enlarge internal improvements. At the time of the Crimean War he remained neutral, and in 1855 signed a concordat with the pope by which the clergy secured large influence over educational affairs. He took the field in person in 1859 in the war between France and Italy. His forces were defeated at Magenta and Solferino, which resulted in the loss of Lombardy. In 1864 he formed an alliance with Prussia to annex Schleswig-Holstein, which resulted in a dispute over the division, and led to the war of 1866 between Austria and the allied forces of Prussia and Italy. This war, known as the Seven Weeks' War, ended with the defeat of the Austrians at Sadowa, and led to the exclusion of Austria from the North German Confederation. Francis assumed a conciliatory policy in 1865. Soon after a constitution was granted, Hungary reconciled, and the kingly crown accorded to him. Since then Austria has been prosperous, a result following the reform of its civil laws. The concordat was suspended in 1870, when the educational affairs were placed under the direction of the national government, higher institutions of learning multiplied, and internal improvements fostered. The emperor was popularized by wisdom and liberality in state affairs.

FRANCIS JOSEPH I.

FRANCIS MOUNTAINS, a group of the White Mountains, in New Hampshire, from which they are separated by the White Mountain Notch. Mt. Lafayette, height 5,295 feet, is the highest peak. Many beautiful lakes, steep precipices, and natural forests give the region a beautiful natural aspect.

FRANCIS XAVIER. See **Xavier.**

FRANCO-GERMAN WAR. See Germany.

FRANCKE (frän'keh), **August Hermann**, teacher and theologian, born in Lübeck, Germany, March 23, 1663; died June 8, 1727. He graduated at Leipsic in 1685, and began academical biblical lectures there while a student. Later he secured an appointment at Luneburg, afterward at Dresden, and in 1689 returned to Leipsic to continue lectures on topics relating to the Scriptures. In 1692 he was called to Halle, where he became professor of Oriental languages, and made a profound impression upon the educational aspect of his time. About the same time he secured an appointment as minister for the suburb Glaucha, where the neglected condition of the children attracted his attention and caused him to organize a school to promote their elementary training. In 1698 he founded an orphan asylum, and a few years later established a pedagogium and Latin school with dormitories attached. This establishment grew remarkably fast, and in 1714 was attended by 700 girls and 1,080 boys, who received instruction from 108 teachers under the superintendence of Francke. The success and wide-spreading influence of his educational establishment gave a new impetus to modern education and made Germany the land of pedagogy. The institution founded in Halle still flourishes. It embraces many magnificent buildings, a library and excellent apparatus, while on an average 1,850 students attend. There are departments of medicine, science, languages, and industrial arts, and extensive laboratories. The instruction retains a high moral tone.

FRANKFORT (frănk'fort), a city in Indiana, county seat of Clinton county, on Prairie Branch River, forty miles southwest of Indianapolis. It is surrounded by a rich agricultural, dairying, and fruit-growing country. Among its facilities are several railroads, electric and gas lights, paved streets, and a public library. There is a modern county courthouse. It has fine public schools, numerous churches, and excellent private residences. Among the manufactures are pottery, carriages, flour, cigars, machinery, and ironware. Population, 1900, 7,100.

FRANKFORT, a city of Franklin county, Kentucky, capital of the state and of Franklin county, on the Kentucky River, sixty miles east of Louisville. It is the focus of railroad lines penetrating all portions of the state, and has the advantage of steamboat communication on the Kentucky River. There are numerous parks, paved streets, electric lights, a well organized public school system, and several educational institutions, including an institute for feeble-minded children, a young ladies' seminary, and the Kentucky Military Institution. The surrounding country is agricultural, and noted for its production of fine thoroughbred trotting horses, cereals, and fruits. Among the manufactured products are pottery, twine, barrels, lumber products, vehicles, whiskey, cotton goods, and machinery. Population, 1900, 9,487.

FRANKFORT-ON-THE-MAIN, an important city in the province of Hesse-Nassau, Germany, twenty miles southeast of Mentz, on the Main River. It is an important center of railroad and navigation commerce. There are electric car lines, modern lighting, splendid pavements, and numerous promenades and public parks. Besides the public school system, it contains the Städel Art Institution, historical museum, and many important societies of literature and art. In its squares and public parks are numerous statues of celebrated citizens, among them those of Gutenberg, Goethe, and Schiller. The most prominent of its buildings include the cathedral St. Bartholomew, public hall, opera house, courts of justice, and central railroad station; the depot is counted the most elaborate in Europe. Frankfort is one of the wealthiest cities of modern Europe, contains the ancestral home of the Rothschilds, and ranks as a center of manufacturing and jobbing trade. Among the manufactured products are perfumery, ironware, soap, chemicals, clothing, sewing machines, leather goods, and fabrics. It long held its place as the most important free city of the German Empire, was the seat of the elections of German emperors, and received its name from Charlemagne, who made it the seat of a political and religious council in 794. It was the place of meeting for the German diet in 1816-36. The city became Protestant as early as 1530. In it have been concluded many important peace treaties, among them the treaty closing the Franco-German War, which was signed in May, 1871. Among the banking and money markets of Europe those of Frankfort take very high rank. Population, 291,560.

FRANKFORT-ON-THE-ODER, an important commercial city in the province of Brandenburg, Germany, on the Oder River, about fifty miles southeast of Berlin. There are several railroad lines connecting it with the national capital and the cities of central Europe. It constituted an important member of the Hanseatic League, was the scene of many battles in the Thirty Years' War, and is at present a flourishing manufacturing and educational center. Among the products are leather, machinery, fabrics, clothing, chemicals, pottery, furniture, toys, and porcelain. The river is navigable and connected by canals with the Elbe and Vistula, thus giving ample outlet for its manufactured products, jobbing trade, and passenger traffic. Telephones, electric railways, educational institutions, libraries, and scientific societies are among its public facilities. Population, 57,360.

FRANKLIN, county seat of Venango

county, Pennsylvania, on the Allegheny River, about seventy miles north of Pittsburg. It is well connected by railroads and enjoys a considerable trade. The city has excellent pavements, sewerage, public schools, and is surrounded by an agricultural country. Among the manufactured products are machinery, flour, fabrics, oil, vehicles, and cigars. Valuable deposits of mineral oil and coal abound in the vicinity. The city has a fine courthouse and other public buildings. Population, 1900, 7,317.

FRANKLIN, Benjamin, eminent statesman, born in Boston, Mass., Jan. 17, 1706; died in Philadelphia, Penn., April 19, 1790.

BENJAMIN FRANKLIN.

He was the son of a tallow-chandler and soap-boiler, was apprenticed as a printer to his elder brother, and developed much fondness for books and writing. When seventeen years of age, he went to Philadelphia, where he arrived with $1.25, and by prudent economy saved sufficient to establish a newspaper in 1729. He was appointed deputy-general of the British colonies in 1753, and the next year served as a member of the Albany convention, in which he proposed an important plan for colonial union. During his leisure he experimented with scientific matters, for which purpose he fitted up a small laboratory, and made discoveries regarding the theory of positive and negative electricity. By the use of a kite he demonstrated that electricity and lightning are identical, and subsequently invented the lightning rod or conductor. His "Poor Richard's Almanac," founded in 1732, was published until 1757, and was the source of some profit. It was a medium of considerable utility in the educational affairs of the colonists. He was the agent of Pennsylvania in England in 1757-62, and again from 1764 till the Revolution. Part of the intervening time he also represented New Jersey, Massachusetts, and Georgia.

While Franklin's early education was limited, he ranked as a versatile reader from early youth, secured a wide fund of knowledge by self-activity, was elected a member of the Royal Society of England, and granted academical degrees by Oxford and Edinburgh. In 1774 he presented the first petition of the American congress to the king of England and was elected a member of congress on returning to America. He favored the Declaration of Independence, and in 1776 was sent as commissioner plenipotentiary to France for the purpose of securing an alliance between that country and the United States, in which position he rendered valuable services to the American cause. The benefits accruing from his negotiations included a loan of very large sums of money and later other valuable concessions. After the surrender of Burgoyne, he concluded an alliance with France, subsequently made a treaty with England, and later a commercial treaty with Prussia. On his return from England in 1785, he was chosen president of Pennsylvania. That state sent him as a delegate to the federal convention in 1787 for the purpose of aiding in the formation of the constitution, which, when completed, met his hearty approval. Besides his "Poor Richard's Almanac," he produced numerous papers on scientific subjects and on political economy and anti-slavery questions, but died before completing his autobiography. He wrote his own epitaph long before his death. It is a famous production, as follows:

"The Body
of
Benjamin Franklin, Printer,
(Like the cover of an old book,
Its contents torn out,
And stript of its lettering and gilding,)
Lies here food for worms.
Yet the work itself shall not be lost,
For it will (as he believed) appear once more
In a new
And more beautiful Edition,
Corrected and Amended
By
The Author."

FRANKLIN, Sir John, naval officer and explorer, born in Lincolnshire, England, April 16, 1786. He was the youngest son of an agriculturist, attended school at St. Ives and Louth, in 1800 entered the navy as a midshipman, and in 1801 took part in the battle of Copenhagen. In 1801-03 he accompanied Captain Flinders on a voyage of discovery to Australia. On returning to England he was appointed to the Bellerophon, and at the battle of Trafalgar managed her signals. In 1819 he conducted an exploring expedition from Hudson Bay to the interior of Canada, made a second expedition in 1825-27, and was knighted in 1829. In 1836-43 he was governor of Tasmania, two years later took command of the Erebus and Terror, and with an escort of 134 men and officers started upon an expedition of discovery to the Arctic seas, sailing from Greenhithe, May 19, 1845, but he never returned. A document deposited in a cairn in 1847, and found in 1850, gave the latest details of the ill-fated expedition. From this it was learned that Franklin died June 11, 1847; that the crew abandoned the ship April, 1848, and that the survivors, 105 in number, entered upon a march to the Great Fish River. Though a number of relics of the company have been discovered, none of the party survived.

FRANKINCENSE (frăn̲k'ĭn-sĕns), a gum or resin, which, when burning, yields aromatic fumes and is used largely as an

incense in religious services. The Greeks and Jews as well as other ancient peoples employed olibanum, which is still used chiefly in eastern countries, while in the United States the exudations of coniferous trees are employed largely.

FRANKS, the name of a number of German tribes that inhabited the regions of the Lower Rhine in the 3d century. They defeated the Romans in Gaul, and controlled France from that time till the rise of the Capetian dynasty in 987, giving to that country the Merovingian dynasty, from 481 to 987. For security against hostile tribes, they lived in villages. They committed their laws to writing, were industrious, and gave France the Salic laws. The descendants from these peoples now form the chief Germanic element of northern France and the western part of Germany.

FRANZ JOSEPH LAND, an island archipelago in the Arctic Ocean, north of Nova Zembla. It was discovered by the Payer-Weyprecht expedition in 1873, and named in honor of the emperor of Austria. There are two main islands, containing numerous fiords, a peak 5,000 feet above sea-level, and a number of islets.

FRASER (frā'zẽr), the largest river of British Columbia, rises in the lake region of the Rocky Mountains. It has a general course toward the south, and, after flowing 650 miles, discharges into the Gulf of Georgia. The Fraser is navigable for more than one hundred miles, contains valuable salmon fisheries, and flows through a mineral country rich in gold and silver deposits. Its principal tributaries are the Stuart, Thompson, and Quesnelle rivers.

FRAUNHOFER (frown'ho-fẽr), **Joseph von**, celebrated optician, born in Bavaria, Germany, March 6, 1787; died in Munich, June 7, 1826. After an apprenticeship to a glass polisher, he entered upon the study of optics, and became a celebrated manufacturer and inventor. The superiority of his optical instruments enabled him to discover dark lines fixed on the solar spectrum, called Fraunhofer's lines. Later he also found similar lines in the spectra of the moon and several of the planets. These discoveries led to the invention of the spectroscope and the development of the science of spectroscopy. Later he invented several devices useful in microscopy, a form of heliometer, and the stage-micrometer.

FREDERICK (frĕd'ẽr-ĭk), a city in Maryland, county seat of Frederick county, thirty-two miles northwest of Washington. It is the focus of several railroads. The surrounding country is agricultural, and contains rich deposits of iron, copper, slate, and limestone. It is the seat of a fine school system, Frederick College, and a state asylum for the deaf and dumb. The two battles of South Mountain and Monocacy occurred near the city. Francis S. Key was a native of the county and is buried in Mount Olivet cemetery. The manufactures include flour, coaches, woolen goods, tobacco, and machinery. There are gas and electric lights, pavements, waterworks, a fine courthouse, good schools, and other improvements. Population, 1900, 9,296.

FREDERICK I., emperor of Germany, surnamed Barbarossa, also called Holy Roman emperor, born in 1121; died June 10, 1190. He was the son of Frederick II., duke of Swabia, succeeded his father as duke of Swabia in 1147, and secured the imperial crown in 1152 as successor to his uncle, Emperor Conrad III. His long reign was distinguished principally by a series of wars against the Italian principalities and other neighboring powers, and various complications with the pope. In 1162 he conquered Milan, five years later laid siege to Rome, and sustained a marked defeat at Legnano in 1176. He immediately recruited his army and turned his attention to conquering vassals in Germany and crushing the wealthy Guelphs. Later he made Poland tributary, and reduced Bohemia, Austria, and Denmark. Having made himself master of western Europe, he invaded Asia Minor, defeated the Mohammedans in several battles at Iconium and Philomelium, but on Jan. 10, 1190, was drowned in the Pisidia, a river of Syria. His sudden death had a depressing influence upon the Crusaders and excited profound grief in Germany, where his memory has always been cherished as one of the wisest and bravest of the nation. He enacted admirable laws, patronized learning, built valuable internal improvements, and solidified the spirit of nationalism in his dominion.

FREDERICK I., first king of Prussia, third elector of Brandenburg, born in Konigsberg, July 22, 1657; died Feb. 25, 1713. He was crowned at Konigsberg on Jan. 18, 1701. Shortly after he sent an army of 20,000 men to take part in the Spanish Succession War, of which a portion served with distinction at the battle of Blenheim. He also wielded much influence by placing auxiliary forces at the disposal of friendly adjacent princes, and assisted the duke of Orange in his expedition against England to secure the throne. Internal affairs were greatly improved by the founding of institutions of learning, among them the University of Halle, and the encouragement of arts and sciences. He pursued the policy of his father, Frederick William, elector of Brandenburg, in defending Protestantism.

FREDERICK II., king of Prussia, known as Frederick the Great, born in Berlin, Jan. 24, 1712; died Aug. 17, 1786. His early education was devised by his father and consisted of an extremely rigorous course, intended to harden him for the conduct and life of a soldier. He married Princess Elizabeth Christina of Brunswick in 1733, and became king on May 31, 1740. He maintained the governmental forms established by his

father, but possessed greater liberality and ruled with a spirit of enlightenment. Charles VI. of Austria died the year that Frederick ascended the throne, and the latter at once began extensive military preparations for the purpose of taking possession of Silesia. He invaded that province with an army of 30,000 men, defeated the Austrians at Mollwitz in 1741, and near Czaslau in 1742, and by the treaty of Breslau secured Glatz and Upper and Lower Silesia. The opposition of Maria Theresa, queen of Austria, led to a second war in 1744, which terminated by the peace of Dresden in 1745, and assured the permanent possession of Silesia. By these successes Frederick raised himself to the height of power as a sovereign of his time. After eleven years of peace, in 1756, the Seven Years' War began, for which he had made an alliance with England and was opposed by France, Austria, Russia, Sweden, and Saxony. Though the fortunes of war were against him in several minor engagements, he was generally successful, defeating the opposing armies in numerous decisive battles, and by the treaty of Hubertsburg, in 1763, confirmed his title to Silesia. To recover from the terrible ravages of war he melted the silver in his palaces into money, encouraged internal industries, and soon paved the way for an era of prosperity. In 1764 he concluded an alliance with Russia, adding Polish Prussia and Great Poland to his possessions, strengthened the army, and by continual economy accumulated the immense sum of 70,000,000 thalers. His chief trust was in his treasury and in his army. Having provided the former, he organized the latter by securing 200,000 sturdy men, disciplined with the greatest strictness under his own supervision. His death occurred from an exposure at a military review. When viewed in the light of sagacity, energy, and enlightenment, history recognizes in him one of the greatest figures of modern times.

FREDERICK THE GREAT.

FREDERICK I., emperor of Germany, Frederick III. of Prussia, son of William I., born in Potsdam, Oct. 13, 1831; died June 15, 1888. He studied at Bonn, and secured military training under von Moltke. He took an efficient part in suppressing the revolution in 1848, and in 1857 married Victoria Adelaide, eldest daughter of Queen Victoria. During the war with Austria, in 1866, he was a prominent leader, and had personal command of an important position in the battle of Sadowa. He commanded the army corps that invaded Lorraine and Alsace in the Franco-German War of 1870-71, was made field marshal-general and, after the organization of the new empire, assisted his father in the administration. Later he traveled in foreign countries, studied the civil and political institutions of Eurasia, and on March 9, 1888, succeeded his father as emperor of Germany. Though having a profound military training, he was an ardent advocate of peace, which made him universally popular. In 1887 he became afflicted with throat trouble, and underwent a critical surgical operation. He died three months after ascending the throne.

FREDERICK I.

FREDERICK, Charles Nicholas, celebrated soldier and field marshal, born in Berlin, Germany, March 20, 1828; died June 15, 1885. He was a nephew of Emperor William I., secured a strict military training, served in the first Schleswig-Holstein war, and defeated the Austrians in 1866 at Koniggratz. In 1870 he drove Bazaine into Metz, and on Oct. 27, 1870, received the surrender of the fortress. Later he captured Orleans, defeated General Chanzy at Le Mans, and destroyed the army of the Loire. In 1879 his daughter, Louise Margaret, married a son of Queen Victoria, the duke of Connaught. He ranked as an efficient commander and strategist, and was called "Red Prince," from the color of the red hussar uniform that he usually wore.

FREDERICKSBURG, a city in Spottsylvania county, Virginia, about fifty-two miles north of Richmond. It has railroad conveniences, electric lights, waterworks, and several fine school and church buildings. The surrounding country produces cereals, live-stock, and fruits. Population, 1900, 5,068.

FREDERICKSBURG, Battle of, one of the important battles of the Civil War. It occurred at Fredericksburg, Virginia, on Dec. 13, 1862. General Burnside had resolved to march upon Richmond, and, accordingly, moved his troops to the heights opposite Fredericksburg, on the north side of the Rappahannock. His army consisted of 125,000 men, the right wing of which was commanded by Sumner, the center by Hooker, and the left by Franklin. The army under General Lee numbered 80,000, with Jackson as commander of the right wing, and Longstreet of the left. The Federal forces crossed the river by three pontoon bridges in the two days preceding the battle.

It was planned that Burnside should make the chief attack and hold the road, while Sumner and Hooker should carry the stone-wall which ran along the foot of the hill, and ultimately storm the heights. An insufficient number of troops had been assigned to Franklin to effect the object intended. The attacks made by Hooker and Sumner were unsuccessful, but failed largely for want of support from Franklin. The Confederate loss was 5,250, while the Union army lost 12,350, and the entire battle proved disastrous to the Federals. Two days later Burnside withdrew from Fredericksburg, and he and Franklin were relieved of their commands shortly after. General Hooker was appointed to succeed Burnside in command of the army of the Potomac.

FREDERICK WILLIAM, elector of Brandenburg, born in Berlin, Feb. 16, 1620; died May 9, 1688. He, next to Frederick the Great, was the chief founder of Prussian power, and is known as the "Great Elector." He ascended the throne at a time when the treasury was empty and the country devastated by the Thirty Years' War, but immediately pursued a vigorous policy in replenishing the treasury, maintained the independence of Prussia, and strengthened the means of national defense. In 1674 he drove the Swedes from Pomerania and Brandenburg, and otherwise extended and strengthened his dominion. Frederick III., his son, succeeded him and afterward became Frederick I. of Prussia.

FREDERICK WILLIAM I., king of Prussia, son of Frederick I., born in Berlin, Aug. 15, 1688; died May 31, 1740. He was imbued with a passion for military achievement, but gave evidence of much sagacity and devotion to the improvement of his country. In 1715 he added the islands of Usedon, Wollin, Stettin, and a part of Swedish Pomerania, which he secured as a partial war indemnity from Charles XII. of Sweden. The succeeding years of his reign were devoted entirely to internal improvements, higher learning, and the administration of justice. Schools, colleges of industry, and other centers of learning were established and an effective army organized. At the time of his death Prussia possessed the best disciplined army of Europe, which numbered 80,000 men, and the largest national deposit of cash, a sum equal to $6,750,000.

FREDERICK WILLIAM II., king of Prussia, nephew of Frederick the Great, born Sept. 25, 1744; died Nov. 16, 1797. His reign was distinguished by favoritism, extravagance in public expenditure, strict censorship of the press, and abridgment of clerical powers. In 1794 he enlarged the kingdom by annexing a portion of Poland. The total amount of territory added by him through conquest, purchase, and inheritance included 46,000 square miles. Under his direction the code of laws prepared by Frederick the Great was revised and introduced.

FREDERICK WILLIAM III., king of Prussia, eldest son of Frederick William II., born Aug. 3, 1770; died June 7, 1840. He married Princess Louise, daughter of the duke of Mecklenburg-Strelitz, who possessed lofty impulses and aided him in many national enterprises. Upon ascending the throne, he surrounded himself with capable ministers and removed the principal causes for grievance instituted by his father. He was required to surrender some territory to Napoleon in 1801, but secured Hanover in return. Afterward he was compelled to form an alliance with France, though this terminated shortly after the return of Napoleon from Moscow, and later gained advantage by the battles at Leipsic and Waterloo. After the conclusion of a long series of wars, he labored sincerely to restore prosperity, and brought about some constitutional reforms in the government.

FREDERICK WILLIAM IV., king of Prussia, son of Frederick William III., born Oct. 15, 1795; died Jan. 2, 1861. He married Princess Elizabeth of Bavaria in 1823, but left no issue. His opposition to the new constitution established by his father led to the revolution of 1848. In 1849 he was offered the title of emperor, but declined it. Shortly after he summoned a national parliament at Erfurt for the purpose of uniting the German states under a new constitution, which finally resulted in the establishment of a representative parliament. Through it the German states were solidified, and a spirit of nationalism developed. A stroke of paralysis, which affected him in 1857, largely clouded his mind and led to the appointment of his brother William as regent on Oct. 7, 1858, who afterward became his successor as William I.

FREE CITIES, a name applied to cities that form independent governments or states by themselves. At the time of the French Revolution there were about fifty free cities in Europe, mostly members of the German Confederation, but at present there are only three—the cities of Lübeck, Bremen, and Hamburg. All others lost their special privileges on account of international political changes.

FREEDMEN'S BUREAU, formerly a branch of the war department of the United States, organized by an act of congress in 1865 with the view of providing for the needs of liberated slaves, and to aid in fitting them to become self-supporting citizens. Gen. O. O. Howard was appointed commissioner. The bureau was discontinued in 1870. In the five years of its existence it handled a fund of $20,000,000, which was raised by grants, bounties, and prizes, and gave valuable assistance to the freedmen during temporary need.

FREEMAN, Edward Augustus, educator and historian, born in Harborne, Eng-

land, Aug. 2, 1823. He was educated at Trinity College, Oxford, and became a fellow there in 1845. In 1857-58 he was examiner in the School of Law and Modern History, again in 1863-64, and in the School of Modern History in 1873. Subsequently many honorary degrees were granted him, among them one each by the University of Cambridge and the University of St. Petersburg. His work in history, both as a writer and teacher, was distinguished on account of its searching and accurate characteristics, and for the extensive manner of treatment of various themes. His writings include architectural history and parliamentary subjects, and were published both as contributions to periodicals and in book form. Among his best known works are "History of the Roman Conquest;" "Historical Geography of Europe;" "Ottoman's Power in Europe;" "History of Architecture;" "Some Impressions of the United States;" "Lectures to American Audiences;" "Travels in Greece and Italy," and "Greater Greece and Greater Britain." His writings relative to American subjects were produced subsequently to his travels in the United States in 1881-82.

FREEMAN, James, clergyman, born in Charlestown, Mass., April 22, 1759; died in Newton, Mass., Nov. 14, 1835. His training was in the Episcopalian Church, but he afterward adopted Unitarian tenets. In 1777 he graduated at Harvard, organized the first Unitarian society of America, and preached in the Episcopal church in Boston, which subsequently became the first Unitarian church in New England. His work spread rapidly to many portions of the United States. Harvard conferred upon him the degree of doctor of divinity in 1811, and later he became a founder of the Massachusetts Historical Society.

FREEMASON (frē'mā-s'n), a member of a secret fraternity dating from the Middle Ages. Originally membership was limited to skilled artisans, but now it includes a far wider range, and the fraternity has branches and lodges in all civilized countries. The present form of organization dates from 1717, when it was reorganized on the avowed principles of charity, brotherly love, and mutual assistance. According to the legends of the craft it is traced back through the centuries to the building of Solomon's temple, and according to some to the tower of Babel and the building of Noah's ark. Many interesting details are given as to its early organization, and development is traced from the times of Solomon, Hiram and Tyre, the Pharaohs, the ancient Roman nation, and lastly the Knights Templar.

The modern fraternity of Freemasons has its true source in the building corporations maintained in the mediæval period, when members of those organizations passed to different portions of Europe to hew stone and construct massive and durable forms of architecture. Certain signs and passwords were used by the skilled workmen, which served as a sign of fraternity, efficiency, and worthiness, such signs being kept a secret among the craft. The most distinct types of production by the stonemasons are found in the monasteries and other massive edifices of Germany. In England they date from 926, when a conference of masons was held at York, attended by King Athelstan. In the 12th century they proceeded to Scotland, of which fact many massive abbeys give evidence. The reorganization of 1717 occurred at London, while branches were established in France in 1725; America, in 1730; Russia, in 1731; Germany, in 1740, and later in all civilized countries. From the first branch lodge established in New Jersey sprang many thousands of others, until at present there are sixty grand lodges in the United States and British America, about 12,000 subordinate lodges, and a membership of 950,500.

Findel's "History of Freemasonry," translated into the English in 1889, is by far the most scientific and complete work on the subject of Freemasonry, and gives an intensely interesting account of the growth and development of the fraternity. At various times, like other secret societies, it has been declared useless and harmful by divers religious councils. In the United States and elsewhere there are numerous degrees, to which applicants are initiated under a system of instruction and tests. The election of new members is by ballot, and various signs, passwords, and grips are given, by which members in need of assistance and succor may be tested before more than ordinary or usual benefits are extended. The grand and subordinate lodges elect officers by ballot, who are eligible to re-election. Careful study of a suitable course is incumbent upon the members and officers, in order to secure the greatest degree of efficiency and skill in conducting the business appertaining to the fraternity.

FREEPORT, a city of Stephenson county, Illinois, 108 miles northwest of Chicago, on the Pecatonica River. It is the converging center of several important railroads. Besides having a fine public school system, it is the seat of Freeport College, a Presbyterian institution, founded in 1872. The surrounding country is dairying and agricultural. Among the manufactured products are carriages, flour, bicycles, farm machinery, vinegar, hardware, and cigars. It has a fine system of lighting, sewerage, rapid transit, waterworks, public library, and is the seat of important railroad carshops. Population, 1900, 13,258.

FREE PORTS, a name applied to ports at whose wharves vessels of all nations are permitted to load, reload, or unload free of commercial charges and customs duties, paying only a nominal harbor fee. Free ports were established in the Middle Ages for the purpose of attracting trade to certain cities, and these enjoyed special advantages when pro-

hibitive or protective customs went into effect in other commercial centers. Since 1888 the free port cities have become greatly limited, among the few remaining in Europe being Hamburg, Bremen, and Trieste. Those not European include Hongkong, Singapore, Livingstone, in Guatemala, and several others.

FREE-SOIL PARTY, a political party of the United States, organized at Buffalo, New York, in 1848. It maintained an opposition to the extension of slavery as its cardinal principle. At first it was made up of different minor parties, such as barnburners, liberty party, whigs, and abolition party. Its first candidate for office was Martin Van Buren and its last John P. Hale; the former in 1848 and the latter in 1852. As neither candidate received a considerable number of votes the party was merged into the newly formed republican party in 1856.

FREETHINKERS (frē'thĭnk-ẽrz), a term originated in England and applied to deists in the 17th and 18th centuries, who held tenets in favor of natural as against revealed religion. In the time of Frederick the Great the term began to be used in Germany. In France it was applied to such writers as Diderot, Voltaire, and Helvetius, and in England to Hume and Lord Bolingbroke. At present the term is common among Christians as well as others, since it is taken to designate rationalism.

FREE TRADE, the term applied to national and interstate commerce when unrestricted by tariffs or customs. Advocates of this system hold that commerce among the nations should be as unrestricted as trade between the various states of the Union, though some think that duties should be levied, but only to obtain revenue and without regard to the effect on domestic industries. Among the advantages argued in favor of such a system are that it is the method of nature, by which every individual has a right to buy in the cheapest market and sell in the dearest; that attempts to check this right result sooner or later in an artificial commercial condition and cause financial disaster. It is also held that the right of property implies freedom for every one to do the best he can with his own, so long as he does not infringe on the rights of others, and that protection benefits only a minority of a nation at the expense of a great majority. As to protecting infant industries, it is held by free traders that long experience has demonstrated that individuals benefited by a tariff system continue to advocate taxation for their personal gain, and that the institutions meant to be matured after years of paternal assistance never reach maturity. In 1846 Great Britain made a step toward free trade by opening its markets to free admission of grain, and since then has gradually extended the free list until the commercial policy is practically one of free trade.

No great political party of the United States has yet advocated an absolute system of free trade. The free list has been enlarged greatly by placing on it commodities and raw materials not produced in this country, largely through the advocacy of a policy of tariffs for revenue only, thereby making the object rather one of collecting revenue than for the limitation or prohibition of imports. The principle of free trade is in direct opposition to a system of stimulating industry by bounties or limiting importation by so-called protection or a protective tariff system. It is claimed on one hand that nations like England, consuming more of the principal products than they produce, thrive under a system of free trade, while, on the other hand, the countries producing largely the food and apparel products can be benefited best by a partial free list and limited tariffs, though local conditions largely tend to modify or restrict the particular legislation most essential to the common weal. In this respect the experience of Germany, where high tariff rates are maintained, furnishes numerous examples.

FREEZING (frēz'ĭng), the changing of a liquid into a solid under the influence of cold. A large body of water cannot be cooled below the temperature of 32° Fahr. until the entire mass has been changed to ice. During the change from water to ice heat is liberated from the water, the amount being greater than any other substance liberates in cooling. Consequently an equal amount of heat disappears when ice is changed into water. Advantage is taken of the cooling produced by the solution of solids to obtain low temperatures, and freezing-mixtures are made by combining solids, or liquids and solids, which, when mixed, dissolve and cause a reduction of temperature. A simple mixture of this kind consists of one part salt and two parts ice or snow, with which a temperature as low as 5° Fahr. can be obtained. The most powerful mixture known, which will make alcohol of the consistency of oil or melted wax, is made by dissolving solid carbonic acid, or solid nitrous oxide gas, in sulphuric ether, giving a temperature of —120° to —220° Fahr. When matter passes from a liquid to a gaseous state, heat is again liberated, the degree of cold varying with the rapidity and extent of evaporation. See **Ice**.

FREIBURG (frī'bŏorg), an important city of Baden, Germany, on the Dreisam River, thirty-two miles northeast of Basel. It contains beautiful specimens of Gothic architecture, the most important being a cathedral built of red sandstone. This edifice has a tower 375 feet high and is remarkable for lightness and elegance. It was begun in 1122 and completed in 1513. The city also contains a university founded in 1454, the Ludwigskirche, several libraries, public parks, theaters, and museums. There are manufactures of clothing, potash, tobacco, paper, chicory, textiles, and machinery. Several railroads and electric car lines fur-

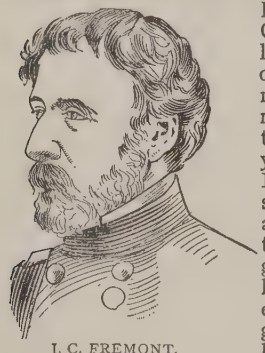
nish ample means of communication, while many modern municipal facilities abound, such as telephones and electric lights. Population, 43,175.

FREMONT (frē-mŏnt'), a city in Ohio, county seat of Sandusky county, on the Sandusky River, thirty miles east of Toledo. It is connected by numerous railroads and several steamboat lines, being at the head of river navigation. There are several public buildings, including a fine courthouse. It is the seat of a normal and business college, excellent schools, numerous churches, and has street railways, city waterworks, and gas and electric lights. The manufactures include flour, boilers, butter and cheese, woolen fabrics, machinery, and vehicles. Population, 1900, 8,439.

FREMONT, a city in Nebraska, county seat of Dodge county, on the Platte River, thirty-five miles west of Omaha. It is the focus of numerous railroad lines, connecting it in all directions. The surrounding country is fertile and noted for its production of cereals and domestic animals. It has a normal college, excellent public schools, a city library, and splendid churches. Among the municipal facilities are electric lights, paved streets, waterworks, and telephone connections. The manufactures include flour, cigars, woolen goods, ironware, cured meat, machinery, and dairy products. Population, 1900, 7,241.

FREMONT, Daniel Chester, eminent sculptor, born in Exeter, New Hampshire, April 20, 1850. He studied in the United States and Italy, and afterward settled in Florence. Among his most celebrated productions are "Minute Men of Concord;" "Peace and War;" "Death and the Sculptor;" "Statue of Governor Chase of Michigan," and "Statue of the Republic." The last named was displayed in the court of the World's Columbian Exposition, Chicago, in 1893.

FREMONT, John Charles, celebrated explorer and general, born in Savannah, Georgia, Jan. 21, 1813; died July 13, 1890.



J. C. FREMONT.

He graduated at Charleston College in 1830, received an appointment as teacher of mathematics in the navy three years later, and in 1839 was commissioned as lieutenant in the corps of topographical engineers. In 1842 he conducted an extensive geographical survey between the Missouri River and the Pacific Ocean. He was brevetted captain in 1844; explored the great western basin in 1845, including portions of Utah and Nevada, and discovered a pass to the Pacific, which led to the acquisition of California by the United States. Soon after he was court-martialed on a charge of disobedience to superior military officers and found guilty, but the penalty was remitted by President Polk, though a part of the sentence was sustained, which caused Fremont to resign his commission. In 1848 he organized a large expedition to explore the mountains of California, reaching Sacramento in the spring of 1849, and secured a fine tract of valuable mineral land. He was United States senator from California in 1850-51. In 1855 he removed to New York City, and became the first candidate of the republican party for president in 1856. When the Civil War began, he was made major-general, and given command of the western department with headquarters at St. Louis. Stonewall Jackson outgeneraled Fremont in his campaign, which caused his transfer to Virginia, but this led him to resign and take no further active part in the war. In 1878-81 he was governor of Arizona, later practiced law in New York, and at various times was connected with southern railroad enterprises. In 1841 he married the daughter of Senator Thomas H. Benton of Missouri. Congress placed him on the retired list of the war with the rank of major-general in 1890. His services were of inestimable value to the United States, while foreign countries regarded him a benefactor of mankind, a gold medal from the king of Prussia being among the many marks of recognition. He is popularly spoken of as "Pathfinder of the Rocky Mountains." Among his published works are "Memoirs of My Life;" "Fremont's Explorations," and "Reports of Exploring Expeditions to the Rocky Mountains."

FRENCH BEAN, a twining annual plant with alternate leaves, whitish flowers, and seeds more or less kidney-shaped. There are many varieties, the most common being the Lima bean. They are native to the East Indies, whence they were brought to Europe by the French, but are now cultivated very extensively in all countries.

FRENCH CONGO, a large colonial possession of France in West Africa, containing an area of 425,000 square miles and a native population of 8,275,000. Its southern and eastern boundaries are formed by the Congo, Ubangi, and Welle rivers and British East Africa; northern by Waldai; and eastern largely by the German Cameroon and Lake Tchad. The native inhabitants are chiefly savage, engaging in hunting, fishing, and rude forms of agriculture. Among the exports are caoutchouc, ebony, palm kernels, coffee, redwood, ivory, palm oil, elephants' teeth, and drum opal. The French title to this possession is based on the explorations of M. de Brazza. He obtained concessions from the natives and occupied Gaboon, a region along the coast included with the state. The country possesses valuable tim-

ber, fertile soil, and is susceptible to material development. Libreville is the capital, whence the colonial government is administered under the direction of France. Other cities are Mayumba, Baraka, Lambarene, Brazzaville, and Franceville.

FRENCH GUIANA (gē-ä′nạ). See **Guiana.**

FRENCH GUINEA (gĭn′ē), a colonial possession of France, on the western coast of Africa, between Sierra Leone and Portuguese Guinea, containing an area of 48,000 square miles and a population of 148,875. In 1890 it was detached from the provincial government of Senegal and made a separate colony, but is governed largely from Dahomey. Among the chief productions are live-stock, cereals, ivory, palm oil, india-rubber, gum, and sesame. The drainage is partly by the Niger and partly toward the west by the Grande. Konakry is the local capital.

FRERE (frâr), **Pierre Edouard,** eminent painter, born in Paris, France, Jan. 10, 1819; died at Ecouen, May 23, 1886. He studied in Paris under Paul Delaroche, and exhibited his first productions in 1843 at the salon. His subjects are largely scenes from domestic life, amusements of children, and portraits, bearing marked traces of purity and grace. A number of his works were exhibited in the galleries of France, while a painting, "Preparing for Church," is in the Corcoran gallery at Washington. Among his other productions are "Boys Going From School;" "Orphan's First Prayer;" "Little Gourmand;" "Girls Going From School," and "The Gleaner Boy."

FRESCO (frĕs′kō), the art of painting with water colors on fresh plaster, or on a wall covered with mortar not entirely dry. The most satisfactory results are obtained when the plaster is laid on as the painting proceeds, since the unhardened fresh plastered walls permit the color to sink and form a more satisfactory surface. It was highly developed as an art by the ancients, and is now generally employed for large pictures on walls and ceilings. Numerous well preserved frescos are to be seen in many of the temples. Splendid specimens of ancient frescos were found in Pompeii, Egypt, India, and Mexico, though the art was not brought to the greatest perfection until the rise of the finer Italian art in the 16th century. Many of the ancient paintings were executed in what is called fresco secca, which is quite distinct from genuine fresco, since it is executed on dry walls and ceilings, previously moistened with lime-water.

FRESNEL (frā·nĕl′), **Augustin Jean,** physicist and inventor, born in Broglie, France, May 10, 1788; died near Paris, July 14, 1827. He was educated at Paris, became government engineer to the department at Vendée, and later of public works in Paris. In 1814 he turned his attention to the study of polarization of light, and added much valuable knowledge of its properties to science. His inventions include a system for lighting useful in lighthouses, which is known by his name and is used almost universally. In 1823 he was elected a member of the Academy of Science.

FRESNO (frĕs′nō), a city in California, county seat of Fresno county, about forty miles north of Tulare Lake, and 200 miles south of San Francisco. The city possesses electric lights, street railways, numerous manufactures, and is a central railway point. Among the manufactures are flour, furniture, agricultural implements, ironware, cigars, and wine. The surrounding country is fruit, cereal, sheep, and mineral producing. An abundance of water-power is drawn from the falls of the San Joaquin River, about thirty miles distant. Besides numerous schools, it contains many beautiful churches and private residences. Population, 1900, 12,470.

FREYCINET (frā-se-nā′), **Charles Louis,** statesman, born in Foix, France, Nov. 14, 1828. He was educated at the Ecole Polytechnique, appointed engineer of the first class in 1864, and became a member of the council in 1870. In 1876 he was elected to the senate and became premier in 1879, but his ministry resigned several times before its final resignation in 1892, though it was longer in power than any other of the present republic. Under his direction the government vigorously suppressed several conspiracies, checked socialism and anarchy, and made republicanism popular in France. In 1878 he was elected a member of the Academy of Science and subsequently an officer of the Legion of Honor.

FREYTAG (frī′täg), **Gustav,** celebrated author, born in Kreuzburg, Germany, July 13, 1816; died May 1, 1895. He studied at Breslau and Berlin, and lectured on German language and literature at the former university from 1839 to 1847. In the meantime he published several editions of poetry and plays. He edited the "Grenzboten" at Leipsic in 1848-70, during a portion of which time he held a court position, and in 1879 settled in Wiesbaden. His poems, novels, and dramas are alike brilliant and realistic, a number of which have been translated into English by Mrs. Malcolm. Among the best known are "Graf Waldemar;" "Debit and Credit;" "Lost Manuscript;" "Our Ancestors;" "Doctor Luther;" "Dramatic Technics," and "The Valentine."

FRICTION, in mechanics, the resistance arising when the surfaces of two bodies pass over each other. All bodies have elevations and depressions, more or less prominent, and the projecting points of one body render movement more difficult by entering the cavities of the other. However, it also depends upon pressure and slightly upon adhesion. Friction is greatest when a body at rest begins to move, thereby making it difficult for a power to displace the body, owing to its inertia being influenced by friction. The

inertness is greatest in large and heavy bodies. Friction is a retarding force in nature, and gives stability to bodies which otherwise would be easily displaced. Since friction generates heat, it is one of the chief means of developing electricity.

FRIENDLY ISLANDS, or **Tonga Islands,** an island group in the South Pacific Ocean, about 250 miles southeast of the Fiji Islands. The islands, about 150 in number, are divided into three groups by two narrow channels, and have a total area of 390 square miles. Tongatabu, having an area of 125 square miles, is the largest and contains Nukualofa, the capital. About thirty of the islands are inhabited by friendly natives, the total population being about 22,500. The island group was discovered in 1643 by Tasman, and visited in 1777 by Captain Cook, who applied the present name. The islands are partly of volcanic and partly of coral origin and have a fertile soil. A number of active volcanoes exist; the most prominent are Tofoa, height 2,785 feet, and Late, height 1,790 feet. The productions include copra, sponges, coffee, wool, and tropical fruits. Manufacturing is in a primitive state, the products including rude machinery, pottery, and wearing apparel used by the natives. Christian missionaries began active work in 1877, since which time the Christian cause has secured many adherents, schools have been established, and a general advance made in moral and intellectual development. The government is directed by a native Christian chief, and is administered under a constitution. There is a representative parliament and a well established judiciary. European customs, education, machinery, and utensils have been largely introduced. The islands are neutral by agreement of the European powers, and their government is successfully administered.

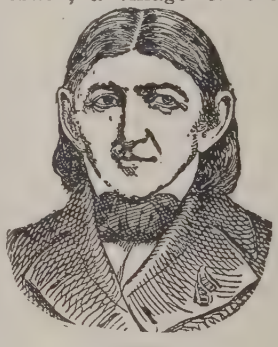
FRIENDS, Society of. See **Quakers.**

FRISIANS (frĭzh'ănz), an ancient German race that dwelt in the northwestern part of Germany, between the Rhine and the Ems. The Romans under Drusus made them tributary, but later they led several revolutions on account of Roman oppression. Subsequently their district was reduced to Friesland; but in the 9th century they obtained their independence, which they maintained till 1498, when their history became merged into that of Germany and Holland. They are an industrious people, have a fine literature, and include a number of eminent historians, poets, and scientists.

FROBISHER, Sir Martin, celebrated seaman in the time of Elizabeth, born in Yorkshire, England, about 1535; died in Plymouth, Nov. 7, 1594. He went to sea when a boy, became skilled as a navigator, and was the first Englishman to attempt the discovery of a northwest passage to China. After attaining to skill as a navigator, he made three expeditions to Labrador and the Arctic regions for the purpose of finding a passage to India by the northwest, and attempted the settlement of the region bordering on Hudson Bay. In 1585 he had command of a vessel under Sir Francis Drake in his famous expedition to the West Indies. He commanded squadrons against the Spanish Armada in 1590, capturing numerous ships, and afterward plundered the Spanish vessels sailing to America. In 1594 he assisted Henry IV. of France, taking part in the siege of Crozon, near Brest, where he was mortally wounded and died in Plymouth soon after.

FROBISHER BAY (frŏb'ĭsh-ẹr), an inlet at the western end of Baffin Land, about twenty miles wide and 200 miles long, and marked by precipitous, rocky shores. Its fisheries are valuable, but the catching season is short on account of extremely cold winters.

FROEBEL (frö'bẹl), **Frederick Wilhelm August,** celebrated reformer and educator, born in Oberweissbach, a village of the Thuringian Forest, Germany, April 21, 1782; died in Marienthal, June 21, 1852. His mother died shortly after his birth, and his education devolved upon his father and uncle, both village pastors. Left largely to himself in the Thuringian Forest, he developed a marked insight into the essential unity of nature's laws by a profound interest in nature studies. After securing a rudimentary education and taking a course in higher work, he engaged partly in teaching and partly in more especially fitting himself for the lofty calling of teaching. Beginning in 1807, he studied at the celebrated institution of Pestalozzi at Yverdon, near Neuchatel, where he remained two years for the purpose of qualifying himself in exemplifying the educational principles deduced from the instruction of that master-teacher. In 1811 he studied in Göttingen, later in Berlin, and in 1813 enlisted in the army. After the peace of Fontainebleau, in 1814, he returned to Berlin, where he became curator of the museum of mineralogy. Soon after he established a school at Keilhau, where he was assisted by Langethal and Middendorff in carrying out his advanced views in educational science. Soon after he wrote "Treatise on the Theory of Teaching," and organized a branch school. Recognizing the need of trained teachers, he began to instruct assistants for the primary work, and in 1836 founded his Kindergarten, or "Garden of Children," at Blankenburg, a system of education which has since spread to all civilized nations. The kindergarten



FROEBEL.

system of training beginners as instituted by Froebel is generally popular in Austria; has a widespread foothold in Germany, Italy, Switzerland, and the Netherlands, and is meeting with growing enthusiasm in America. Besides his advanced theories for teaching young children in following the course of nature and leading them to grow and expand in accord with natural laws, he influenced the higher education perceptibly, both in theory and application. Among his published works are "Education of Man;" "Treatise on Sphericity;" "Pedagogics of the Kindergarten," and "Songs for Children." He also edited "The Weekly for All Friends of Culture."

FROG, a tailless amphibian animal with four legs, flat head, rounded nose, very large mouth, and teeth on the upper jaw and palate. The hind legs are very long and stout,

WOOD FROG. WATER FROG.

and the feet webbed. On the hind feet are five toes, while the front feet have only four. The tongue is thick and fastened in front to the lower jaw so the back part may be thrown out of the mouth very quickly, thus enabling it to catch insects, bugs, and various other forms of life on which it feeds. It swims by means of its hind legs and lives much of the time in the water. However, an adult frog cannot live in the water, having lungs, thus being required to come to the surface at intervals to breathe. In winter it lies burrowed in the mud, and may be heard in spring as soon as the sun has loosened the frost.

The female frog lays from 600 to 1,200 eggs, usually in March, which consist of a gelatinous mass with minute, black globules. By the end of April they have enlarged and hatched, the young being known as tadpoles. The tadpoles breathe by means of gills and have a tail, swimming about like small fish. Their hind legs appear first, later the fore legs, after which they remain dormant and the tail is absorbed, when they are said to "live on their tail." Soon after they quit the water and begin to breathe by lungs instead of gills. The process of breathing is carried on by the action of the muscles of the throat and abdomen. All species are destitute of ribs. They make a loud, croaking sound, especially the bull-frog of North America, which grows to a length of fifteen to twenty inches. While frogs are usually green in color, they often have stripes or spots of dark-brown on the back, and the throat is yellow. The eggs of the frogs, like those of fishes, are fertilized after they are laid. Many people consider the hind legs of the American bull-frog excellent food. Several species known as wood frogs live in timber districts, frequenting the trunks and limbs of trees in search of food.

FROISSART (frois'ärt), **Jean**, poet and historian, born in Valenciennes, France, in 1337; died in Chimay about 1410. The personal history of Froissart is known only from the incidents detailed in his verses and the "Chronicles." It appears that he received a liberal education, was trained for the church, but possessed a passion for poetry and the charms of knightly society. He commenced a history of the wars of his period at the age of twenty. To secure data he traveled to examine the places at which historic battles occurred, that he might detail accurately the events. His line of travel was through France, Britain, Germany, Switzerland, Italy, and Spain. The writings based on his travels furnish valuable information regarding the customs and habits of the people, and of the more important events connected with the countries visited en route. He made a second visit to Britain in 1361-66, when he became secretary to the queen of England, and later was entertained by King David Bruce. His "Chronicles" was edited in his native town, but he returned to England after a lapse of forty years to study newer developments, and again returned home to complete his descriptions by revising and editing. It is certain that he was an interesting story teller, resourceful in securing information and accurate in detailing events. On account of his wit, shrewd observance, and gay poetry he was everywhere honored and welcomed. His "Chronicles" is a valuable work for illustrating the character and manner of his age, and embraces the events occurring from 1326 to 1400. It has been translated into Latin and numerous modern languages. The original manuscript is in the library at Breslau, Germany.

FROST (frôst), the minute crystals of ice formed directly from atmospheric water-vapor. At a temperature of 32° Fahr. the watery vapor becomes so cold that it cannot condense into water, but falls to the earth in the shape of frost instead of dew. This is known as white or hoar frost. The name is often applied to moisture hardened by cold after it has fallen in the form of dew, or to the inside of window panes in a warm room. Frost is very destructive to plants, as the water in the juices expands when freezing and thereby bursts the vesicles. Clouds and smoke act as a covering to check radiation.

Winds bring fresh masses of air into contact with the cold objects and prevent frost, which accounts for dew and frost falling most abundantly at night when there is little movement in the atmosphere. Black frost is caused by cold so severe that plants freeze and change color without showing any signs of hoar frost. A frost-bite is a state of numbness of any part of the body of an animal, but especially of the extremities, by exposure to extreme cold. In like manner plants partially frosted are said to be frost-bitten.

FROUDE (frood), **James Anthony**, historian, born in Totness, England, Jan. 23, 1818; died Oct. 20, 1894. He studied at Westminster and Oxford, and in 1842 was elected as fellow of Exeter College. In 1844 he took deacon's orders, but soon after engaged in literary work by contributing to magazines. He was elected rector of St. Andrews University in 1869, where he received an honorary degree. In 1874-75 he visited the South African colonies in the interests of the British government, and published a number of reports relative to that section of the world. He possessed a degree of ability that gave his history the fascination of fiction and displayed a supreme literary power, but his historical works are largely impaired by distorted views and unfairness in giving tone to the motives of other nations and peoples. As a versatile and prolific writer he was rivaled only by Macaulay, though his productions lacked the fairness with which that writer treated non-British institutions. Among his most important productions are "Shadows and Clouds;" "History of England from the Life of Woolsey to the Defeat of the Spanish Armada;" "Short Stories on Great Subjects;" "Two Lectures on South Africa;" "Life of Lord Beaconsfield;" "Life and Letters of Erasmus;" "Divorce of Catharine of Aragon," and "The English in Ireland in the Eighteenth Century."

FRUIT (frut), in botany, a mature ovary containing the seeds, especially such plant products as are pleasant to the taste and eaten by man and animals. Other parts of the flower, most frequently the calyx, sometimes remain after the flowering is over, undergo a further development, and form part of the fruit. All that is external to the seed in ripe fruit, is called the pericarp and is the edible portion, except in such berries as grapes, gooseberries, and others, whose pulpy matter is formed from the placentas of the seeds. The value of fruit to man exceeds that of all other parts of plants. Among the more important fruits in the temperate climates are apples, peaches, plums, cherries, melons, apricots, mulberries, strawberries, raspberries, and others, while with those of the warmer regions may be included the dates, olives, figs, grapes, oranges, bananas, nuts, etc. See **Horticulture**.

FRY, Elizabeth Gurney, philanthropist, called "The Female Howard," born in Norwich, England, May 21, 1780; died Oct. 12, 1845. She was converted by the efforts of William Savery and joined the Society of Friends. Soon after she organized a school for poor children, at which eighty attended, and in 1800 married Joseph Fry, a merchant of London. In 1813 she devoted her energy to the betterment of the female prison at Newgate, preached the gospel, and with her brother visited the prisons of Scotland in 1818, and of Ireland in 1827. The house of commons acted upon her suggestions by establishing departments of instruction and manufacturing in the prisons, and made provision for giving religious aid to convicts. She made an extended visit to France in 1838; in 1840 traveled through Germany, Belgium, and Holland, and the following year visited Copenhagen. A monument in the form of a refuge was erected to her memory in London.

FRYE, William Pierce, statesman, born in Lewiston, Maine, Sept. 2, 1831. He studied at Bowdoin College, was admitted to the practice of law, and in 1861 and 1867 was elected to the state legislature. In 1867-69 he was attorney-general of Maine, served as representative in congress twelve years consecutively, and was appointed to fill a vacancy in the United States senate occasioned by the resignation of J. G. Blaine, taking his seat in 1881. Subsequently he was re-elected for several consecutive terms, serving his constituents in a prominent and effective manner. In 1896 he was elected president pro tem. of the senate, and in 1898 was appointed by President McKinley as one of a committee of five to negotiate a treaty of peace with Spain. He was granted degrees by Bowdoin and Bates colleges, and served as a trustee of the former. In 1900 he was re-elected to the United States senate.

FUCHSIA (fū'shĭ-à), a genus of flowering shrubs native to Mexico, South America, and New Zealand, and so named from the discoverer, Leonard Fuchs (1501-66), a German botanist. There are about fifty known species. The calyx is funnel-shaped and four-parted, with the four petals set alternately in the mouth; the style is long, and the stigma capitate. They are favorites as house and garden plants and thrive in a light rich soil, though growing best in a mixture of loam and peat. New plants may be developed from young cuttings set in sand or loam.

FUEL, the material with which a fire is fed, including various forms of carbonaceous matter, such as gaseous, liquid, and solid substances. The phenomenon of heat arises by combining fuel with oxygen, as by combustion, and forms an essential element for manufacturing and domestic purposes. Natural gas, common coal gas, and acetylene gas are forms now largely used for heating, lighting, and manufacturing. Among the liquid fuels are alcohol, creosote, petroleum, shale-oil, and various vegetable and animal oils. Each of these is used with success for

divers purposes, though petroleum and creosote constitute the principal kinds used in the large manufacturing establishments, and alcohol where a small volume of heat, which can be easily regulated, is wanted for small manufacturing enterprises and in experiments. Among the solid fuels are wood, coal, peat, wood-charcoal, and coke. In pioneer settlements and countries destitute of mineral fuel, wood and its products are the principal forms used, though coal and its products constitute by far the most important fuel used in the great centers of manufacture, ocean navigation, railroad operation, and for heating purposes. The extensive natural gas deposits in America and Eurasia are having a marked influence, not only in propelling machinery, but in smelting and refining. Within recent years lighting by electricity has displaced the consumption of fuel for street illumination and largely as material for house lighting, especially in large centers of population. At the present rate at which electricity is coming into use for heating purposes, it is not improbable that some plan will be devised to displace many other forms by this inexhaustible agent.

FULLER, Melville Weston, celebrated jurist, born in Augusta, Maine, Feb. 11, 1833. In 1853 he graduated at Bowdoin, studied law at Bangor and Harvard, and was admitted to practice at the bar in 1855. He edited the "Augusta Age" for several years. Besides serving on the common council, he was city attorney. He removed to Chicago in 1856, where he practiced law successfully for thirty-two years.

MELVILLE W. FULLER.

In 1862 he was a member of the Illinois constitutional convention, was elected to the Illinois house of representatives the following year, and served as a delegate to all the democratic national conventions from 1864 to 1880. President Cleveland nominated him chief justice of the United States supreme court in 1888, and he entered upon the duties of that office in October of the same year. As a presiding judge and jurist he ranks among the most distinguished of America.

FULLER, Sarah Margaret, Marchioness Ossoli, celebrated authoress, born in Cambridgeport, Mass., May 23, 1810; died July 13, 1850. She was the eldest child of Timothy Fuller, a jurist and statesman, learned German, French, Italian, and Spanish, and in 1836 settled in Boston as a teacher of languages. The following year she was chosen principal teacher in one of the schools in Providence, Rhode Island. Besides teaching, she contributed to the "New York Tribune" and other periodicals, and wrote several works of literary value. In 1846 she traveled in Europe, and the following year met Marquis Ossoli in Rome, whose wife she afterward became. In 1848-49 she contributed much to the cause of Italian independence by writing and speaking, and in the latter year had charge of two hospitals during the siege of Rome, while her husband aided the army in defending the city. After the capture of Rome by the French in 1849, she and her husband spent some time in hiding, and in 1850 embarked for America. A violent storm drove the vessel on the shoals of Fire Island, near New York, in which they and their infant child perished. The body of the latter was found on the beach some time after, but their remains were never recovered.

FULMAR (fŭl'mär), a species of aquatic birds belonging to the petrels, native to the island of St. Kilda and many of the Arctic

FULMAR.

coasts. These birds are about the size of a domestic duck. They feed on whale blubber, fish, and putrid animal matter. The fulmar is valued for the oil obtained from its stomach, and also for its feathers and eggs. The natives gather the eggs, considering them excellent as food. Several species of the fulmar are found in the Pacific Ocean, though they are larger than those native to the Arctic regions.

FULMINATION (fŭl-mĭ-nā'shŭn), the sudden decomposition of bodies by percussion or heat, and accompanied by light and a loud report. Fulminates or fulminating compounds are explosives formed by preparing fulminic acid with gold, silver, platinum, mercury, or other bases. The percussion caps contain fulminate of mercury, which forms the priming. Fulminating powder is a mixture of niter, sulphur, and potash.

FULTON (fo͝ol'ton), **Robert,** celebrated engineer, born in Little Britain, Penn., in 1765; died in New York City, Feb. 24, 1815. When seventeen years of age he became a portrait and landscape painter, and five years later studied painting in London under West, but soon after abandoned art and engaged in mechanical pursuits. His desire to study mechanical engineering was induced by James Watt, Earl Stanhope, and the duke of

Bridgewater, with whom he formed an acquaintance. He secured a patent in 1794 on an inclined plane intended to supersede locks on canals, and later invented a dredging machine, a mill for sawing marble, a flax-spinning machine, and a machine for making ropes. He proceeded to Paris in 1797 and successfully introduced a boat propelled by steam, where he also invented a submarine boat useful in torpedo warfare.

ROBERT FULTON.

Soon after he visited Scotland to obtain drawings of a steam vessel which had plied on the Forth. On his return to America, in 1806, he built the Clermont, a steamboat of considerable size. In 1807 he successfully navigated the Hudson River, making a voyage of about 150 miles in thirty-two hours. Soon after a large number of steamboats were constructed. Though not the first inventor of the steamboat, Fulton caused it to come into general use, and to enter as an important factor in developing the interior parts of the United States. In 1814 he secured several valuable patents on an improved steam warship, which was launched in 1815. Subsequently he turned his attention to improving the submarine torpedo, but died before completing it.

FUNCTION (fŭnk'shŭn), the term applied in the study of animal or vegetable life to designate the specific office or work which any organ or system of organs is intended to perform. The vital functions are those necessary to life, and in the higher animals consist of the specific office or work of the heart, brain, and lungs. The functions relating to the external world, such as voluntary motion and the senses, are called animal functions. On the other hand, the processes of assimilation, respiration, absorption, digestion, and expulsion are called natural or vegetative functions.

FUNDY, Bay of, an inlet of the Atlantic, separating Nova Scotia from New Brunswick. Its length is 165 miles, and breadth about thirty miles. At its upper extremity it branches into Chignecto Bay and Minas Channel and Basin, which are separated from the Gulf of St. Lawrence by a narrow isthmus. Navigation is rendered dangerous by tides that rise and fall rapidly from fifteen to seventy feet. The St. Croix and St. John rivers flow into the bay. A ship railway connects Chignecto Bay with Northumberland Strait.

FUNGI (fŭn'jī), a large order of flowerless plants, which, in their different forms, are known as mushroom, toadstool, blight, mold, rust, smut, mildew, and by other appellations. Fungi are closely akin to the lichen, but are a lower order and grow in different situations, chiefly drawing their food from

TOADSTOOLS.

the objects on which they grow. Their structure is cellular and they are propagated by spores. Some grow in green pastures, other species on decaying trees, or on grasses or grains, which they destroy; others on books in damp places, and some on man and animals in certain diseases. Fungi are found wherever decay is going on. Many species grow very rapidly, springing up in a single night and dying as quickly, and some grow very slowly, adding to their main body year by year. Various forms of fungi are so small that they can scarcely be seen, while others measure several feet in circumference. Several species are used for food and some are valuable for medicine.

Fungi occur in all parts of the earth where it is not too cold, but are most plentiful in moist, temperate climates. Edible mushrooms, well known species of fungi, grow wild in Europe and America, and are largely cultivated for food. Some varieties are grown in great quantities for the market. Truffles are fungi growing under ground like the potato and are used for flavoring sauces and meats. They commonly grow about a foot under ground in loose soil, where they are located by dogs trained to search for them as they do for game. Truffles are about the size of a hen's egg, white or brownish in color, and rough and warty on the outside. They are native to Eurasia, but are grown in the United States. Mildew, rust, and smut grow on plants and destroy them, and are dreaded by gardeners and farmers. There is scarcely any plant that is entirely free from affection by fungus growths, the condition of climate having much to do with their effect. Mold grows on bread or cheese, while mildew comes on cloth or paper, destroying the fiber.

FUNSTON, Fred, soldier, born in Ohio, Nov. 9, 1865. His father, Edward H. Funston, removed to Kansas in 1867, and served as a member of congress for ten years. The son graduated from the Iola high school in 1886, attended the Kansas State University,

and in 1893-94 aided in exploring Alaska. He joined a Cuban filibustering expedition in 1896, and two years later became commander of a United States regiment, with which he was ordered to the Philippines, where he aided in capturing Manila. In 1901 he headed a detachment of troops to capture Aguinaldo, whom he took prisoner about 200 miles northeast of Manila on March 23. Previous to this, in 1899, he had been made brigadier-general, and was awarded a sword for bravery by the state of Kansas.

FUR, the short, soft coat thickly covering the skin of many mammals, or growing next to the skin and under the hairs, which are longer and coarser. Fur, in its usual trade acceptation, is a dressed skin containing the short, fine hairs, and from which the long hairs have been pulled. Before it is fit for use, a skin must be thoroughly cleaned, steeped, and scoured in a bath of meal, alum, and salt; then washed in soap and soda, cleaned, and dried. Other methods are used to prepare for tanning. Furs are often colored, the fur of the seal being commonly changed from a dirty yellow to a rich brown. All the chief fur-bearing animals, such as the sable, marten, mink, ermine, beaver, and otter, are treated in special articles, which see. The use of furs or fur-pelts for covering the body is coëval with the earliest history of all northern nations or tribes. Subsequently it grew into an article of barter and trade, first among themselves and then with their neighbors of more temperate climes, where it became an article of fashion, ornament, and luxury.

The fur trade, in the early history of America, led to commercial ventures on the part of individuals and companies, who operated to facilitate settlement and the discovery of unknown wealth. Russia extended its dominion over Siberia to secure the rich fur trade. Practically the same motive induced the Dutch East India Company to turn its attention to America. The French, after establishing trading posts at Montreal and Quebec and exploring the Great Lakes, battled against England many years to retain possession of the region rich in fur-bearing animals. The Hudson Bay Company, organized in 1670, had exclusive trade with the Indians nearly 200 years, but the royal grant was taken from it in 1868. Since then there have been private collectors and dealers throughout Canada, who compete in the open market for a share of the trade. This is also the case in Alaska and other regions rich in furs. London and Leipsic are the most important fur markets of the world. The enterprise in the United States, although quite extensive, has been conducted by individuals rather than corporations. The Alaska Fur Company holds two of the Aleutian Islands with exclusive right to kill not to exceed 100,000 fur-seals yearly.

FURNACE (fûr'nās), a chamber in which fuel is burned for the production of heat, particularly such as are utilized in boilers, steam engines, melting ores or metals, warming houses, baking bread, and in making pottery. While there are various forms of construction, they should be so built that a perfect combustion of the fuel may be possible, and to apply effectually the greatest possible amount of heat. Unless the plans are carefully made, the heat will dissipate without being concentrated directly on the substance to be acted upon in the process of heating. The constructor must also aim to supply means whereby an operator can easily control at pleasure the degree of heat necessary. Furnaces are variously designated according to the draught applied. Those in which the draught is natural are called air furnaces; those into which a strong current of air is injected by artificial means are termed blast furnaces, and those in which a low arch roof is utilized to turn the flame upon the object against which the heat is to be directed are termed reverberatory furnaces. In heating rooms several classes of furnaces are utilized, such as hot-air, hot-water, gas furnaces, and electric heaters. In hot-air furnaces the heat is radiated through large pipes into the apartments to be warmed, while in hot-water systems the pipes are connected with radiators in the different apartments, which are filled with water, and this is induced to circulate by applying the heat to a definite portion of the system, thus causing hot water to pass to the different rooms and the colder to flow back into contact with the heater. Heating by steam requires practically the same kind of apparatus. Gas furnaces are those in which gas is utilized as fuel. They are constructed in a manner that either hot air or hot water can be applied. In electric heaters the framework is commonly of thin cast-iron, having projections to radiate the heat. Coils of resistance wire, from which the heat of the electric current radiates, are within the framework. From five to twenty amperes are necessary to produce an equable amount of heat on a three-foot heater, on a 110-volt circuit. The heaters are placed where required, connected by wire, and so constructed that the current may be turned on or off as in an incandescent lamp.

FURNESS, Horace Howard, scholar and author, born in Philadelphia, Penn., Nov. 2, 1833. After graduating at Harvard University in 1854, he traveled in Europe three years, and in 1859 was admitted to the bar at Philadelphia. He prepared several excellent editions of works based on Shakespeare, and was honored with a degree at Göttingen University. Among his best editions are "Romeo and Juliet;" "King Lear;" "Merchant of Venice;" "Othello," and "The Tempest."

FURNIVALL (fûr'nĭ-val), **Frederick James**, celebrated philologist, born in

Egham, in Surrey, England, Feb. 4, 1825. He studied at the University College, London, and at Cambridge, was called to the bar in 1849, and devoted himself to the study of English literature and the establishment of numerous societies. Among the societies organized are Early English Text Society; New Shakespeare Society; Chaucer Society; Shelley Society; Browning Society; Ballad Society, and Wickliffe Society. These societies enabled him to edit many valuable productions from rare writings, and to collect humerous paintings and manuscripts, for which purpose he spent about $200,000. Among the most valuable are "Early English and Other Works;" Chaucer's "Canterbury Tales;" Caxton's "Book of Curtesye;" Harrison's "England," and "Leopold Shakspere."

FURTH (fürt), a city in Bavaria, Germany, six miles northwest of Nurnburg, at the junction of the Rednitz and Pegnitz rivers. It is a prosperous city, contains excellent railroad facilities, fine schools, public parks, and libraries. Among the manufactures are jewelry, toys, machinery, lead pencils, and scientific instruments. There are several fine schools and churches. Gustavus Adolphus occupied it in 1632. Population, 45,275.

FUSE (fūz), a tube or casing filled with combustible material and used for igniting a charge in a mine, for blasting, and in discharging a hollow projectile. Fuses were invented as soon as hollow projectiles came into use, and are made in various forms appropriate to the purpose for which they are designed. In mining, blasting, and for submarine purposes a tube is utilized which contains a slow-burning composition, thereby allowing the operators time to get to a place of safety before it burns down to the charge. Many of these, such as the Bickford fuse, are covered with pitch, contain gunpowder, and burn at the rate of one yard in seventy seconds. Percussion and concussion fuses are used for hollow projectiles. The former contain a capsule charged with fulminate, which is exploded with a plunger, or its equivalent, when the projectile strikes, while the concussion fuse is designed to explode the charge when the shell strikes the object. Time and mechanical fuses are used in some forms of torpedoes with dynamite, gun-cotton, and other powerful explosives, and are adapted to burn at different times by cutting off a portion of its length, or by the character of the composition used in its manufacture. Electric fuses are used extensively in the newer implements of war and methods of blasting, and are adapted to ignite by passing an electric spark through them, thereby bringing the current in contact with the explosive composition within.

FUSEL OIL (fū′sĕl), a heavy, inflammable product formed during the fermentation of molasses, potatoes, corn-wort, beet-roots, and the juice of grapes. In the rectification of spirits it is separated, and occurs as an acrid, or oily liquid, in the last stages of distillation. It has a peculiar odor, a pungent taste, and is poisonous, producing nervous depression and headache. Its presence in brandy, whisky, and other beverages can be detected by rubbing them on the hand, when ethyl alcohol will evaporate and the fusel oil may be readily recognized.

FUSING-POINT, the degree of heat at which any substance begins to melt or liquefy. Every substance can be fused at a certain temperature, which is the same in a given substance, if its pressure be constant, but is very different in different metals and substances. Whenever the fusing commences, the temperature of the body ceases to rise, no matter what the intensity or the source of the heat, and the temperature remains constant until the body is completely fused. On the Fahrenheit thermometer the fusing or melting point of mercury is placed at —37.8°; ice, +32°; butter, +89.6°; phosphorus, +111°; sulphur, +257;° tin, +442°; lead, +635°; zinc, +791°; antimony, +842°; silver, +1,832°; gold, +2,282°; and iron, +2,732°. Vitreous fusion is the term applied in the case of substances that melt gradually and have no definite point of fusion.

FUSIYAMA (fōō-zĭ-ä′mä), the highest elevation of Japan, situated on the island of Nippon, about sixty miles southwest of Tokio. Its crater is 500 feet deep. The mountain was active at numerous times prior to 1707, and has an elevation of 12,365 feet above sea-level. The Buddhists hold it sacred, and wander in large companies to its higher places of interest from July to September, when its snows are melted under the more direct rays of the sun.

G

G, the seventh letter and the fifth consonant in the English alphabet. It has two sounds, the hard and soft, and is formed by placing the tongue against the roof of the mouth, then lowering the tongue and giving utterance to voice. The hard sound occurs before a, o, and u, as in gate, god, and gun; before the consonants l and r, as in gloat and groan; also when preceding e and i in beginning a word, as in get and give, and when final, as in big. The soft sound was unknown in Anglo-Saxon. It corresponds to ch, as in church, and is represented by g before e, i, and y, as in gem, gin, and gymnasium. G is silent before n, as in gnat. As a symbol it represents the seventh of the Dominical letters; in music, the fifth note of the normal scale of C, called sol, and also the lowest note of the grave hexachord. In the Guidonian system it represents gamma ut, and in numerals 400, but 40,000 when a dash is placed over it.

GABOON, or Gabun (gä'bōōn), an estuary near Libreville, on the west coast of Africa, articulating with the Gulf of Guinea. It receives the waters of several rivers, and is surrounded by the Gaboon territory, which forms a part of the French Congo. See **French Congo**.

GABRIEL (gā-bre-el'), one of the seven archangels mentioned in the Scriptures, and well known in sacred history on account of announcing the birth of Christ to Mary, and the birth of John to Zacharias. In the Talmud he is described as a prince who commands the thunder and presides over the ripening of fruits. The Mohammedans class him with three other angels that wrote the divine decrees, and as the person who guided Mohammed in writing the Koran.

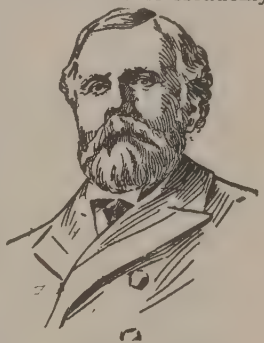
GADFLY, the common name applied to various two-winged flies found in the woods and elsewhere during the hot weather. They delight to suck the blood of man and animals, and leave a large lump, which forms a tumor and secretes pus, wherever they feed for some time. The eggs are deposited in the skin of animals, and the young subsist upon the pus that exudes from the tumor. The mouth has six sharp needles. These constitute a proboscis or sucker with which they penetrate the thickest skin. There are many species, the best known in the United States being the common black gadfly.

GADSDEN (găd'zden), county seat of Etowah county, Alabama, on the Coosa River. It has excellent railroad connections, good schools, and is noted as a yellow pine and fruit market. There are manufactures of flour, machinery, ironware, cotton goods, and tobacco products. The surrounding country is agricultural and contains valuable coal and iron deposits. Population, 1900, 4,282.

GADSDEN, James, soldier and diplomatist, born in Charleston, South Carolina, May 15, 1788; died Dec. 25, 1858. He was the grandson of Christopher Gadsden (1724-1805), a Revolutionary patriot, and served with distinction in the War of 1812. Subsequently he took part in the Seminole campaign in Florida, and in 1822 engaged as a cotton planter in that state. President Polk appointed him minister to Mexico in 1853, in which capacity he negotiated the Gadsden Purchase.

GADSDEN PURCHASE, a tract of land included in New Mexico and Arizona, and containing 45,535 square miles. It was purchased from Mexico in December, 1853, for the United States by Gen. James Gadsden for $10,000,000.

GAGE, Lyman J., banker and public man, born in De Ruyter, New York, June 28, 1836. He attended the Rome Academy for four years, and removed with his parents to Chicago, where he became a bookkeeper in a lumber yard and planing mill. Afterward he secured a position with the Merchants' Savings, Loan and Trust Company, and later became manager of the Bankers' Clearing House. In 1882 he was elected vice-president of the First National Bank, becoming its president in 1891. He was chairman of the committee to select a site for the World's Columbian Exposition, becoming first president of the exposition company, and was an important factor in its management. In 1894-95 he was president of the civic federation of Chicago, and selected by President McKinley in 1897 as secretary of the treasury, in which position he actively promulgated the theories of a single gold standard and the enlargement of the powers of national banks.



LYMAN J. GAGE.

GAINES' MILL, Battle of, one of a series of battles occurring in Hanover county, Virginia, during the peninsular campaign conducted by McClellan. A part of the Federal army crossed the Chickahominy under command of McClellan, while

Fitz-John Porter occupied a position on the north bank of the river with a force of 35,000 men. Generals Lee and Stonewall Jackson made an attack on Porter, June 27, 1862, with a Confederate army numbering 55,000 men. The Federals were driven back with much loss after a two hours' struggle, and were finally forced to give way before superior numbers. Porter crossed the Chickahominy in rapid retreat, burning bridges behind him. His total loss aggregated about 8,000.

GAINESVILLE, a city in Texas, county seat of Cooke county, about eight miles south of Red River and sixty miles north of Fort Worth. It is connected by numerous railroads, and has excellent schools and numerous municipal facilities. The surrounding country is agricultural and stock-raising. Among the manufactures are soap, ice, brick, flour, brooms, machinery, and utensils. Besides a county courthouse, it has many fine school and church buildings. Population, 1900, 7,874.

GAINSBOROUGH (gānz'b'ro), **Thomas**, celebrated landscape painter, born in Suffolk, England, in 1727; died Aug. 2, 1788. He began to study in London when fourteen years of age, became a portrait painter in Bath at nineteen, and later settled in London. In 1768 he founded, with thirty-five others, the Royal Academy. His landscape paintings show much originality and delicacy, while as a portrait painter he rivaled Sir Joshua Reynolds.

GALATIA (gȧ lā'sha), the name anciently applied to an extensive region of Asia Minor, so called from a large number of Gallic inhabitants, who settled there. The Gallic invaders of Greece in the 3d century B. C. under Brennus not only took possession of Byzantium, but crossed the Hellespont, and subdued a large portion of Phrygia and Troas. Later they were confined to certain districts by Attalus, king of Pergamus, the settlements being bounded by Phrygia, Lycaonia, Pontus, Cappadocia, Paphlagonia, and Bithynia. The Galatians retained their old Celtic language more or less distinctly for several centuries, were twice visited by St. Paul, and produced numerous scholars. In government they were divided into three tribes and twelve tetrarchies, each being under a chief.

GALEN (gā'lęn), **Claudius**, celebrated Greek physician, born in Pergamus in Mysia, in 130 A. D.; died about 201. He was a profound student of medicine, practiced as physician in the school of gladiators in Pergamus, and later settled in Rome, where he attended Emperor Marcus Aurelius and his household, and afterward Emperor Severus. Eighty-three of his treatises are extant, besides which are many others that are regarded spurious. His writings were taken as good medical authority until the 16th century, and many are still frequently consulted, especially those treating anatomy and physiology. Galen established the practice of consulting the pulse in the diagnosis of diseases. He also treated the works of Hippocrates in numerous commentaries.

GALENA (gą-lē'nȧ), county seat of Jo Daviess county, Illinois, on the Fevre River, about eighteen miles southeast of Dubuque, Iowa. It is accessible by several railroads and improved highways, giving it considerable trade advantages. There are excellent schools, a library, and many fine churches. The surrounding country is agricultural and also produces zinc, lead, and other minerals. Among the manufactured products are furniture, ironware, boots and shoes, machinery, brick, cigars, dairy products, and woodenware. The city has electric lights, a fine courthouse, and waterworks. Ulysses S. Grant resided in Galena a number of years. Population, 1900, 5,005.

GALENA, a city in Cherokee county, Kansas, in the southeastern part of the state. It is surrounded by a lead and zinc producing country, has good railroad advantages, and a growing trade in farm produce and merchandise. There are electric lights, waterworks, a public library, and a number of fine school and church buildings. Population, 1900, 10,158.

GALESBURG (gālz'bûrg), an important city and the county seat of Knox county, Illinois, about 163 miles southwest of Chicago. It is the focus of several trunk railroads, which connect it with many of the important trade emporiums of the central west. The surrounding country is agricultural and dairying, and contains an abundance of bituminous coal deposits. It has an excellent public school system, numerous libraries, public parks, and is the seat of Lombard University and Knox College. Among the municipal facilities are paved streets, gas and electric lights, electric street railways, and a superior system of city waterworks. The manufactures include flour, brooms, carriages, tobacco, steam engines and boilers, and farming machinery. Population, 1900, 18,607.

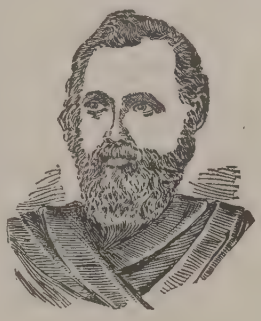
GALICIA (gą-lĭsh'ĭ-ȧ), a province of Austria, whose boundary is formed by Russia on the north and east, and by Transylvania, Hungary, and Silesia on the south and west. It has an area of 30,315 square miles, and a population of 7,550,800. The Carpathians trend between it and Hungary. Its chief rivers are the Dniester and several tributaries of the Danube and Vistula. Among the principal products are cereals, beef and dairy cattle, horses, poultry, fruits, silk, and divers manufactures. The minerals include coal, alabaster, copper, rock-salt, iron, marble, and calamine; of which iron and rock-salt are the most important. The inhabitants consist chiefly of two Slavic peoples, the Poles and Ruthenians, but there is also a considerable per cent. of Germans and Greeks. A well organized public

school system is maintained, which terminates in the celebrated universities of Lemberg and Cracow. Lemberg is the capital. Among the other important cities are Cracow, Przemysl, and Tarnapol. Extensive lines of railroads and navigable streams enable commercial intercourse, while numerous natural resources have facilitated its commerce and manufacture and given the province high importance in the Austrian commonwealth.

GALILEE (găl'ĭ-lē), the name applied anciently to one of the four Roman divisions of Palestine. It was bounded by the Jordan River on the east, by Samaria on the south, by the Mediterranean and Phœnicia on the west, and Syria and the mountains of Lebanon on the north. The northern portion is wooded, but the lower part is level and exceedingly fertile. In the time of Christ the former was usually called Upper Galilee and the latter Lower Galilee. At present the whole of Galilee is included in the vilayet of Syria. Within this region were situated the twenty towns given by Solomon to Hiram, king of Tyre, as compensation for his assistance in building the temple. Galilee was the early seat of Christian influence, and its four towns, Nazareth, Capernaum, Nain, and Cana, were closely associated with the life and travels of Christ. The inhabitants consisted largely of Greeks, Syrians, Phœnicians, Arabs, and Jews, and occupied themselves largely as fishermen. They were held in contempt by the educated Jews because of their simplicity of manner and lack of education, and on account of which the name Galileans was early applied to Christians. Galilee became the seat of the Jewish doctors of law after the destruction of Jerusalem, while Jewish learning centered largely at Tiberias. Numerous ruins still exist in some portions of Galilee, though most of the region is populated by a destitute people and the towns are stricken with poverty and indolence.

GALILEE, Sea of, an inland lake of Syria, also called Sea of Tiberias, Lake of Gennesaret, and Sea of Chinneroth. It is situated on the east central boundary of Palestine. The surface is 682 feet below the Mediterranean Sea. Its extent from north to south is twelve miles; width, seven miles, and its general depth, 825 feet. The basin is of volcanic origin, the water fresh and cool, and the north and east coasts are precipitous and barren. It receives the water of the Jordan and several other streams, abounds with edible fish, and is known for its association with many important events connected with Christ and the apostles. The region surrounding the lake was densely populated in the time of Christ, though at present there are only the remains of ruined towns, including Capernaum, Magdala, Tiberias, and several others of minor importance. A railroad line connects the lake region with the Mediterranean Sea, and offers assurance that at least a limited amount of prosperity will come to the people within the next few decades on account of increased commercial, fishing, and manufacturing enterprises.

GALILEO (găl-ĭ-lee'o), or **Galilei** (gä-le-lā'ee), celebrated physicist, born in Pisa, Italy, Feb. 15, 1564; died Jan. 8, 1642. He descended from an ancient Florentine family, secured an excellent education in literature and arts, and entered the University of Pisa in 1581. Soon after he was induced to investigate the laws of the oscillation of the pendulum by a lamp he saw swinging in the Pisa cathedral,



GALILEO.

and by it was subsequently led to apply his discovery in the exact measurements of time. The works of Archimedes suggested the hydrostatic balance, which he invented in 1586. In 1589 he became professor of mathematics in the University of Pisa. Having devoted much effort to the study of mathematics and natural science, he soon attracted the attention of many learned men. While at Pisa he discovered the law of falling bodies by experiments conducted from the leaning tower at that place, which led him to renounce the accepted philosophies, and thereby drew upon himself the enmity and criticism of other scholars. Shortly after he secured the professorship of mathematics at Padua, where he taught from 1592 to 1610, and enriched the world of science with many valuable discoveries. Among those announced within this period were improvements in the thermometer and the refracting telescope; discoveries in relation to magnetism and the magnet, the satellites of Jupiter; the rings of Saturn; the sun spots, and from their movement from east to west he inferred the rotation of the sun; and the inclination of the sun's axis to the plane of the ecliptic. Galileo's improvements on the telescope were suggested by a report of the first telescope invented in Holland, in 1608. The following year he constructed an instrument by which objects were magnified three times, and finally produced one that magnified thirty-two times.

In 1610 Galileo was appointed philosopher and grand-ducal mathematician at Florence by Cusmo II., grand duke of Tuscany, which afforded him an increased salary and abundance of leisure to promulgate his scientific investigations. By the discovery of the phases of Mercury, Venus, and Mars he further demonstrated the truth of the Coper-

nican theory. He visited Rome for the first time in 1611, where he was received with great distinction, but shortly after was criticised for teaching heresies, to which he replied in a masterful treatise and clearly demonstrated the discoveries resulting from his study of the heavens. His work was examined by a congregation of mathematicians monks, and cardinals, who condemned it as dangerous to the church and science, summoned him before the Inquisition, and in 1633 the veteran philosopher was compelled to fall upon his knees and abjure by oaths the truths he had discovered and so ably maintained. It is claimed by some writers that when he arose he exclaimed, "E pur si muove," meaning "and yet it moves." The Inquisition thereupon sentenced him to the dungeon for three years, but shortly after permitted him to reside in Sienna, and later in Florence. Though losing an eye by disease and having the other highly impaired, he continued his researches, and in 1637 discovered the libration of the moon. His death occurred the year of Newton's birth, after a long and useful life, which was saddened by persecutions and domestic troubles. He was buried in the church of San Croce, Florence. The writings of Galileo exhibit a high degree of literary style, cover a wide range of subjects, and are still consulted extensively by learned men. Natural philosophy is as great'y indebted to him as the science of astronomy.

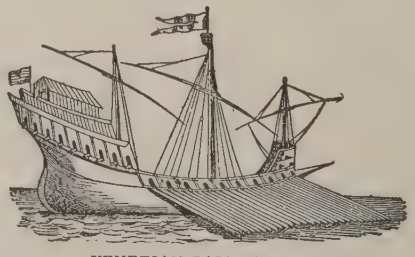
GALION (gā'lĭ-ŏn), a city of Crawford county, Ohio, sixty-two miles north of Columbus. It is the focus of several railroads and has a growing trade. The surrounding country is cereal, fruit, and stock producing. Among the manufactures are vehicles, ironware, flour, pottery, brick, tobacco, and machinery. It is the seat of fine schools, has gas and electric lights, street railways, waterworks, several parks, and contains extensive railroad shops. Population, 1900, 7,282.

GALL, Franz Joseph, founder of phrenology, born in Tiefenbroon, in Baden, Germany, March 9, 1758; died Aug. 22, 1828. He studied in Baden, Strasburg, and Vienna, practiced medicine at the latter city, and spent much time in the study of human and animal skulls. After several decades of close application to phrenology, he announced the particular location of twenty organs, wrote and lectured extensively, and attracted widespread attention. His field of operation was throughout German-speaking countries, France, and also in Britain. Among his most important writings are "Philosophical and Medical Investigations" and "Anatomy."

GALLAIT (gál-lā'), **Louis,** historical painter, born in Tournay, Belgium, March 10, 1810; died in Brussels, Nov. 20, 1887. He is considered the most noted historical painter among the Belgians of modern times, producing numerous excellent works, among them "Abduction of Charles V.;" "Family of a Prisoner;" "Alva Viewing the Dead Bodies of Egmont and Hoorn;" and "A Plague of Tournay." The latter was purchased for the Brussels museum at $24,000.

GALLATIN (găl'ạ-tĭn), **Albert,** famous statesman, born in Geneva, Switzerland, Jan. 29, 1761; died Aug. 12, 1849. In 1779 he graduated from the University of Geneva, emigrated to America the following year, and enlisted for a brief period in the American army. Shortly after the close of the war he taught at Harvard College, became a naturalized citizen in 1786, and three years later was elected a member of the Pennsylvania state convention. He was chosen United States senator in 1793, but was not admitted to his seat, and the following year aided in suppressing the Whisky Insurrection. From 1795 to 1801 he was a member of congress from Pennsylvania, being elected as a democrat, and took a leading part in national legislation. President Jefferson appointed him secretary of the treasury, which position he filled from 1801 to 1813, and became known as one of the ablest financiers of America. He was a peace commissioner in 1813-14, aiding in negotiating the treaty of Ghent, which concluded the War of 1812. From 1816 to 1823 he was United States minister to France, and in 1826 became envoy extraordinary to Great Britain. On returning to America, in 1827, he became president of a bank in New York City. Subsequently he published numerous pamphlets, including several on finance, the war with Mexico, the Oregon question, and various other political and national questions. The most valuable of his publications is "Synopsis of the Indian Tribes," a people to whom he gave much study.

GALLEY, a vessel formerly used extensively in the Mediterranean. It is low and flat-built, has one deck, and is navigated with



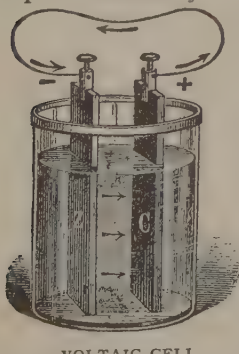
VENETIAN GALLEASS.

sails and oars. The length varied from 100 to 200 feet, the smaller sizes being known as half-galleys, and the smallest as quarter-galleys. On each side were twenty oars, which were worked by several men, and there were two masts covered with lateen sails. The galleasses were the largest in size. They had beams thirty feet long, carried three masts, and about twenty guns, and were

propelled by about 250 rowers. In the reign of Charles VI. they were introduced into France, but abolished in 1748 by Louis XV. These vessels were used for offensive and defensive warfare, and in the time of peace served in furthering commercial enterprises. Similar vessels were kept by the ancient Greeks and Romans for war purposes, and furnished aid in commercial protection and colonization along the seacoast. In printing, a galley is an oblong tray, used to receive the type from the composing-stick, and which serves to arrange it in a column or page. The galley has a flange, about one-half an inch in height, on both sides and at one end. After being taken from the galley to the imposing-stone, the type is arranged in a chase.

GALVANI (gäl-vä'nee), **Luigi**, celebrated anatomist, born in Bologna, Italy, Sept. 9, 1737; died Dec. 4, 1798. He studied in the University of Bologna, entered upon the practice of medicine at that place, and in 1762 was appointed professor of anatomy at the University. In 1791 he published a work relative to his discoveries and theories of animal electricity, and also produced treatises showing advanced views in the study of comparative anatomy. His theories of animal functions in relation to electricity were largely deduced from numerous experiments, and led to valuable results in the knowledge of galvanism, and to the invention of instruments for measuring the force of electric currents. While his writings are not numerous, they are characterized by precision and minuteness of detail. Among them are "Organs of Hearing of Birds" and "Considerations on the Urinary Organs."

GALVANIC BATTERY, or **Voltaic Battery**, a combination of two metals in a liquid chemically acting upon one to a greater extent than the other. The discovery is due to Luigi Galvani (q.v.), from whom the name was applied. In experimenting with the legs of recently killed frogs he noticed that, when hung up against an iron balustrade and the large nerves of the frogs' legs brought in contact with the metal, they twitched as violently as in life. This phenomenon was due to bringing the muscles into electric connection. He ascribed the action to a vital fluid, which he thought came out of the nerves and flowed through the iron to the muscles. The experiments attracted the attention of Volta, a distinguished physicist of Pavia, who showed that these movements were caused by electricity and constructed an arrangement called a voltaic battery or pile, by which powerful continuous currents could be readily produced.



VOLTAIC CELL.

The simplest form of the voltaic cell consists of a plate of zinc and a plate of copper immersed in water containing sulphuric acid. No action takes place, if the zinc is pure, until a complete circuit is made by connecting the plates with a wire, but the plates must not come in contact with each other in the liquid. The action occurs between the liquid and the zinc, and hydrogen gas is seen to escape in minute bubbles from the copper; this gas, being produced by the current of electricity, continues to flow in the circuit as long as the chemical action continues. In this simple voltaic cell the end of the projecting copper plate is the positive pole or terminal, and the corresponding end of the zinc plate is the negative pole or terminal. There are many varieties of voltaic cells, but usually they are arranged in two classes —single-fluid cells and double-fluid cells. In the former only a simple electrolyte is employed, and in the latter two different electrolytes are used, one for each element of the voltaic couple. Ordinary zinc is impure and, when the circuit is broken, is wasted by the electrolyte acting upon it. This tends to weaken the strength of the current when the circuit is replaced. The waste may be averted by amalgamating the zinc, which is done by dipping it in acid and then rubbing mercury over its surface. A battery consists of two or more voltaic cells so connected as to secure a stronger current than can be obtained from a single cell. By constructing a battery with a large number of cells it is possible to overcome a powerful resistance, or to supply a strong current.

GALVANISM (găl'vȧ-niz'm), the branch of electric science that treats of current electricity arising from chemical action, as distinguished from that generated by heat or induction. The term came into use from Galvani, the discoverer of animal electricity. See **Galvanic Battery**, **Electricity**, etc.

GALVANIZED IRON (găl'vȧ-nīzd), the name given to iron covered by a coat of zinc, with or without galvanic deposition. Properly galvanized iron is a sheet of iron first plated with tin and then immersed in a sal-ammoniac and zinc mixed fluid, which forms another coating. Less properly the iron is cleaned by diluted acid and friction, heated, and, without any galvanic current, plunged into a bath of melted zinc covered with sal-ammoniac and stirred until the surface becomes coated with zinc. Articles made of galvanized iron, such as household utensils, fencing wire, roofing sheets, and water pipes, are proof against corrosion as long as the iron is covered with the coating.

GALVESTON (găl'ves-tŏn), a city of Texas, county seat of Galveston county, on Galveston Island, at the entrance of Galveston Bay. It is noted as the most important port of the state. The bay is from ten to twenty miles wide and about thirty miles

long, and the island has a width of three miles and a length of about thirty. There is an extensive breakwater to protect the harbor, which affords unexcelled anchorage and transportation facilities. Regular lines of steamers from New York, Bremen, Liverpool, and other important cities connect with Galveston, while numerous important railroad lines furnish ample commercial transportation facilities with the interior and with Mexico. As a cotton market Galveston is one of the most important centers in the United States, while its trade in lumber, wool, live-stock, and cereals is correspondingly large. Among the manufactures are flour, ironware, beverages, cotton-seed oil, clothing, fabrics, and machinery. The capital invested in manufacturing is $6,500,000, and about 2,000 persons are employed as laborers. Among its institutions are excellent public schools, a Catholic university, the Texas Medical College, city and county buildings, and numerous churches. The city has an extensive system of street railways, gas and electric lighting, and many other modern improvements. In 1900 a large part of it was destroyed by a severe storm, but it was rebuilt with an enterprise equaled only by the activity of its business men. Population, 1900, 37,789.

GALWAY BAY (gal'wā), an important bay on the west coast of Ireland. It is from six to twenty miles wide, thirty miles long, and at its entrance are the Arran Islands. Galway, a seaport of western Ireland, is situated on the northern shore. It is an important manufacturing and commercial city, having a population of 16,570.

GAMA (gä'mä), **Vasco da**, celebrated navigator, born in Sines, in the province of Alemtejo, Portugal, in 1460; died in Cochin, India, Dec. 25, 1524. He descended from an ancient royal family, distinguished himself as a mariner at an early age, and in 1497 was given command of an expedition to discover a southern passage to India. The expedition included four vessels, equipped with abundant apparatus and manned with 160 sailors. He sailed from Lisbon on July 8, and after a stormy voyage of four months reached St. Helena Bay, near the Cape of Good Hope. Later he doubled the cape, cruised along the coast of Mozambique, visited Mombaza, Melinda, and Calicut, India, reaching the latter place May 20, 1498. After remaining at Calicut for some time, the ruler became hostile, and Gama was obliged to resort to forcible means in order to leave the harbor. In September, 1499, he returned to Lisbon, where he was received with much enthusiasm, made a noble and named admiral of the Indies. He was also granted an annual pension and extensive commercial privileges in India. In 1502 he was sent to Calicut with a fleet to avenge the destruction of a Portuguese colony, where he destroyed the Indian fleet, secured a favorable treaty of peace, and on his return voyage to Portugal founded colonies in Mozambique and Sofala. King John III. appointed him viceroy of India in 1524, but he died there three months after landing. The remains were taken back to Portugal and buried with military display. Gama ranks in importance as an explorer and navigator above all others with the exception of Columbus. He succeeded in largely widening the influence and importance of the commerce and prosperity of Portugal.

GAMBETTA (găm-bĕt'a), **Leon**, celebrated statesman, born in Cahors, France, April 3, 1838; died in Paris, Nov. 27, 1882. He secured a college education and studied law in Paris. Becoming imbued with republican doctrines, he opposed Napoleonic oppression of liberal thought. He was elected to the chamber of deputies in 1869 from the Paris district, and in 1870, when Napoleon III. surrendered at Sedan, he proposed the dissolution of the empire and took a prominent part in proclaiming the republic on September 4 of that year. In the new government he became minister of the interior, aided actively in resisting the capture of Paris by the German army, and during the siege escaped from the city in a balloon. After the capitulation of Paris, he still remained active, and refused to participate in the convention for the ratification of the peace treaty. His efforts were potent in reorganizing the republican party and a national force. In 1879 he forced the resignation of MacMahon as president, and the following year was elected president of the chamber of deputies. In 1881 he was selected premier and president of the council. The ultra radical reforms proposed by him ended his ministry in a few weeks. His death was the result of an accident from carelessly handling a revolver, from which he received a dangerous wound in the hand. Gambetta ranks as one of the most eminent public men of the new republic. He was held in universal esteem as a statesman.

LEON GAMBETTA.

GAMBIA (găm'bĭ-a), the oldest and most northerly British colony on the west coast of Africa. It has an area of sixty-nine square miles and a population of 15,260. The surrounding sphere of influence tributary to Gambia comprises with it a colony and a protectorate of about 2,750 square miles and a population of 200,800. There are exports of rice, cotton, corn, hides, beeswax, and rubber. The district contains some exceedingly fertile tracts of land, though much is

unproductive. As a colonial possession it is important mainly on account of commanding the Gambia River, which furnishes extensive means for interior navigation and trade. The government is administered through a local executive and a legislative council. Bathurst, situated on the island of St. Mary, is the chief town and has 7,500 inhabitants. Only a limited number of the population are whites. A considerable missionary work has been done. A large per cent. of the natives are Mohammedans.

GAMBIA, an important river of western Africa, rises in the mountains north of Liberia, flows in a northwesterly direction to the Atlantic, and has a total length of 1,400 miles. The estuary has a width of twenty-five miles some distance from its mouth, but at the place where its waters join the Atlantic it is only about two miles wide. The lower valley is overflowed in the rainy season, leaving rich alluvial deposits, which greatly enhance the annual productions. Vessels navigate the river for 650 miles from June to November, but large craft sail only about ninety miles inland.

GANGES (găn'jēz), one of the most important rivers of Asia, rises in Garhwal, at the western slope of the Himalaya Mountains. It is formed by the junction of the Bhagirathi and the Alaknanda rivers, at Deoprag, about ten miles east of Srinagar. The Bhagirathi is regarded a sacred stream by the natives, has its head 13,800 feet above sea-level, and is considered the source of the Ganges, though a larger volume of water is brought from a great distance by the Alaknanda. Among the principal tributaries of the Ganges are the Jumna, Gandak, Son, and Kusi, though there are numerous other tributaries, while the Brahmaputra receives the main channel of the delta, called the Padma, and the other streams of the delta flow into the Bay of Bengal. The lower basin constitutes the great valley of Hindustan. It contains much fertility and is one of the most important regions of Asia. Branches begin to flow out from the main stream about 225 miles from its mouth, forming a vast delta in the nature of level and waste swamps, through which many channels course and intersect each other at various points. The entire length is 1,650 miles, and the basin drained embraces 395,000 square miles. The largest branches of the delta are the Hugli and the Meghna, the former being on the west side and the latter on the east, and these begin about 200 miles or more from the sea.

Among the principal cities situated on the banks of the Ganges are Cawnpore, Furruckabad, Bahar, Benares, Calcutta, Patna, Allahabad, and Murshedabad. Navigation extends a distance of nearly 1,500 miles from the Bay of Bengal, which makes it an important avenue for commercial and passenger intercourse, though within late years several railroad lines have been constructed in various directions through and along the valley. In the hot season of the year the volume of water is decreased slightly, while in the rainy season great floods cover the lower country, when the water extends over a region about one hundred miles wide. The floods recede about the middle of August, leaving rich alluvial deposits to greatly fertilize the soil. The river is held sacred by the Hindus, who either bathe in it or partake of its waters. From this custom a considerable industry has arisen, and the water is bottled and carried as an article of commerce to the remote interior districts. Bathing in its waters is considered necessary in order to exempt the dead from returning to the earth to recommence life anew. The Hindus think that those who partake of the water have assurance of eternal bliss. Throngs of pilgrims visit various points annually, especially at Allahabad, where a great fair is held periodically.

GANYMEDE (găn'ĭ-mēd), the youngest son of Tros, king of Troy, and celebrated as the most beautiful of mortals. While drawing water from a well at Mount Ida he was observed by Zeus, who noticed his remarkable beauty and sent his eagle to transport him to Olympus, where he was endowed with immortality and appointed cup-bearer to the gods. He is represented in statuary as a youth of exquisite beauty in form, short golden locks, delicate features, beaming blue eyes, and pouting lips.

GARBAGE (gär'bāj), the discarded remnants of materials that accumulate in cities. Within recent years the authorities of the great centers of population have turned their attention to utilizing garbage in fertilizing and increasing the productiveness of the soil. In New York, Boston, and other American cities these wastes are removed by vehicles. Usually they are classified as waste and usable, after which portions are utilized and the remainder is disposed of in a manner best calculated not to impair public health. In many of the cities of Europe garbage is transported by convenient and well protected means to outlying districts, and, as a result, large areas of waste and unproductive lands have been reclaimed and rendered valuable. This process of utilizing offal and sewage has largely improved the sanitary conditions, lessened the liability of breeding trichinæ in hogs fed with refuse matter, and tended to maintain the purity of the city water supply. It is not difficult to realize how sanitary conditions may be improved by lessening the amount of decaying litter.

GARCIA (gar'see-a), **Manuel**, singer and composer, born in Seville, Spain, Jan. 21, 1775; died June 19, 1832. He first appeared to good advantage as a singer at Cadiz and Madrid. In 1808 he obtained success at the Italian opera in Paris, and soon after appeared with equal favor in Rome and Naples. Later he sang in Berlin, Vienna,

and London, and in 1825 visited the United States and Mexico, where he conducted a strolling company made up partly of his own family. After returning to Paris, he devoted himself to teaching singing and voice culture. His second daughter, Pauline Garcia, born in Paris in 1821, also attained to high repute as a vocalist and operatic singer.

GARCIA Y INIGUEZ, Calixto, Cuban patriot; born in Holguin, province of Santiago, Cuba, Oct. 14, 1838; died in Washington, D. C., Dec. 11, 1898. He descended from an excellent family, received a good education, and was trained for the profession of law. In 1868 he began a long career as a Cuban patriot by joining the revolutionary forces in the Ten Years' War. He was put in command of 150 men, with whom he took decisive action by driving the Spaniards from Holguin and other towns of Santiago. When the provincial government removed Maximo Gomez, Garcia became commander-in-chief. In 1873 he was captured by the Spanish forces, transported to Spain, and imprisoned in Valencia and Santona. In 1877 he was released; settled for a time in New York City, and in 1880 returned to Cuba to assist Antonio Maceo in an insurrection. However, he was soon after captured and taken to Madrid, where he remained in prison for fifteen years, during which time he taught French and English to young Spaniards. In 1895 he escaped from Madrid and came to New York, where he enlisted men and secured arms and ammunition valued at $200,000 for service in the Cuban revolution of 1896. Shortly after he proceeded to Cuba and, after numerous campaigns, secured control of a large portion of the interior of the island. In 1898 he rendered valuable services to the United States army with a force of 4,000 Cubans, with whom he took part at the battle of El Caney. He also aided materially by reconciling the Cubans to the temporary occupation of the island by the United States forces. His death occurring shortly after Cuba was liberated, but before the wholesome effects of Spanish evacuation were realized, caused profound sorrow. His remains were taken to Cuba in the United States dispatch boat Dolphin, for burial, accompanied by a large guard of distinguished Americans.

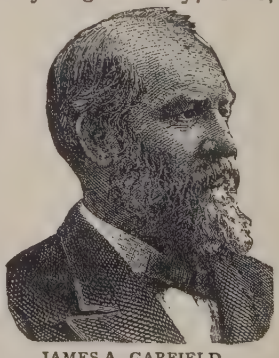
GARDEN CITY, a village about eighteen miles east of New York City, on Long Island, and founded by A. T. Stewart. It was laid out as a model villa town, intended for resident purposes, and beautified by numerous boulevards and avenues of trees. Among the excellent buildings are a fine Gothic cathedral, a memorial school for boys, a female seminary, and other extensive structures. The Protestant Episcopal bishop of Long Island has his residence in Garden City. It is a popular residence of many New York business men.

GARDINER (gärd'ner), **Samuel Rawson,** modern historian, born in Hampshire, England, March 4, 1829; died Feb. 23, 1902. He graduated at Oxford, after which he was made professor of modern history in King's College, London. In 1885 he was elected fellow of All Souls', Oxford, for the purpose of pursuing advanced historical studies. While holding that position he devoted much time to writing and preparing extensive treatises in relation to the civil war and the commonwealth, and also edited public documents, family papers, and parliamentary debates. A civil pension was granted him in 1882 by the crown for valuable historical productions, and in 1894 he received the appointment as regius professor of modern history at Oxford. Among his writings are "History of the Great Civil War;" "History of England from 1603 to 1642;" "Thirty Years' War," and "History of the Commonwealth and Protectorate." His wife, Bertha Mariton Gardiner, published a manual entitled "The French Revolution."

GARDINER, a city of Kennebec county, Maine, at the junction of Cobbossa and Kennebec rivers, about twelve miles below Augusta. An abundance of water power facilitates the operation of numerous manufacturing establishments, including saw mills, machine shops, and flouring mills. Among the municipal improvements are electric lights, waterworks, pavements, and a public library. Population, 1900, 5,501.

GARDNER, a city of Massachusetts, in Worcester county, on the Otter River. It has good railroad and electric railway facilities. Much capital is invested in manufacturing establishments, which employ about 2,250 men, and average an output valued at $2,500,000. The surrounding country is fruit growing and agricultural. Among the manufactures are furniture, ironware, implements, clothing, and machinery. Population, 1900, 10,813.

GARFIELD (gär'feeld), **James Abram,** twentieth president of the United States, born in Orange, Cuyahoga county, Ohio, Nov. 19, 1831; died Sept. 19, 1881. His father, Abram Garfield, came from Massachusetts ancestors, having descended from English Puritans who founded Watertown in 1630. In 1830 his parents moved to Ohio, settling in what is now known as the Western Reserve, where his mother was left a widow with four small children, of whom James was the youngest. His early schooling was obtained during the winter terms in the rural districts, but he made rapid progress by assistance from his

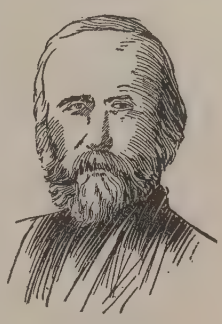


JAMES A. GARFIELD.

mother, and enlarged his knowledge by studious and constant reading. In 1848 he worked as a tow-boy on the Ohio Canal, entered Hiram College in 1851, and graduated from Williams College, Massachusetts, in 1856. Soon after he returned to Hiram College as a teacher of Greek and Latin, and became president of that institution in 1857. In 1859 he was elected state senator as a republican, and in 1861 organized a regiment of his students and was given charge of a brigade in Kentucky. For marked bravery and superior skill he was promoted to the rank of brigadier-general. Among the battles in which he served with distinction are Shiloh, Corinth, and Chickamauga. While serving in Alabama he was appointed chief-of-staff of the army of the Cumberland, and later made major-general of volunteers.

At the request of President Lincoln he resigned his commission in the army on Dec. 5, 1863, and hastened to Washington to take his seat in congress, to which he had been chosen fifteen months before. His career as a legislator was equally as brilliant as his military record. He was a member of the committee on military affairs; and was chairman of the appropriation committee and of the committee on banking and currency. In 1877 he served as a member of the electoral commission and in the same year was elected senator from Ohio. The convention at Chicago, held in June, 1880, nominated him for president of the United States, and, after a hard fought contest, he secured the election, defeating W. S. Hancock. He served in the presidency only four months, being shot by an assassin, Charles J. Guiteau, on July 2, 1881, while in the Baltimore and Potomac depot at Washington. After lingering in a weakened condition he died at Elberon, New Jersey, where he had been conveyed for medical treatment. The remains were taken to Cleveland, Ohio, at which place an elegant monument was erected to his memory. President Garfield was successful in every line of life and always showed a willingness to struggle for merit. However, his political career was marked by severe party opposition and charges of being connected with the famous Credit Mobilier. His mind was cultured, and he always stood for the observance of the law and the advancement of learning. His early success as a teacher led him to be popularly designated "the schoolmaster president."

GARIBALDI (găr-ĭ-băl'dĭ), **Giuseppe**, soldier and patriot, born in Nice, France, July 4, 1807; died in Caprera, June 1, 1882. His busy life was begun as a sailor. He obtained democratic views in politics by coming in contact with Italian liberals at various ports of Italy. In 1834 he joined the movement inaugurated by Mazzini in favor of Italian independence, which proved unsuccessful and led to his condemnation, but he escaped to France. Later he went to South America to join the army of Uruguay, then fighting for its independence. In his South American struggle he showed much skill as a leader in privateering, and while there married a Creole. In 1848 he returned to Italy for the purpose of aiding that country in the common defense against the Austrians. The following year he commanded the combined forces against France and Austria, but was eventually defeated, and sought safety in the United States. In 1854 he returned to Italy, where he purchased the small island of Caprera, off the north coast of Sardinia, on which he made his home. He again took up arms for Italian liberation in 1859, attaining the decisive victories of Marsala and Palermo, and assumed the dictatorship of Sicily.



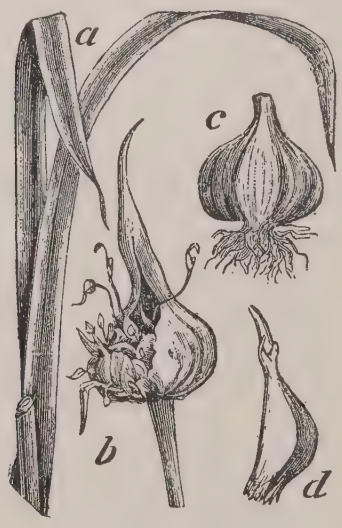
GARIBALDI.

In September, 1860, Garibaldi with a force of volunteers captured Naples, which led to the fear that he would endeavor to attain power over all Italy, but he readily acquiesced in annexing Sicily to Italy, and again retired to private life on his island farm. In 1862 he led an unfortunate expedition against Rome, in which he was wounded and captured, but was released soon after. Subsequently he made a journey to England in the interest of Denmark, which proved successful. His last struggle for Italian independence occurred in 1866, when he was defeated at Mentone, and held captive in Rome, but soon after escaped and returned in a boat to Caprera. In 1870-71 he aided the French against the allied German army. He became a member of the Italian parliament in 1875. Garibaldi, as a legislator, was radical, as a democratic thinker, studious, and as a republican leader, uncompromising in his efforts to secure Italian independence and the separation of the state from papal authority. There are few, if any, patriots in the history of the world who have been more devoted to the cause of country and more persistent in effort than he.

GARLAND, Augustus Hill, statesman and jurist, born in Covington, Kentucky, June 11, 1832; died Jan. 26, 1899. After securing an education, he was admitted to the bar of Arkansas in 1853, and in 1861 became a member of the provisional congress at Montgomery, Alabama. He was chosen a member of the first Confederate congress and later became a senator of the Confederate States. Though elected a senator of the United States in 1867, he was not permitted to take his seat. In 1874 he became governor of Arkansas, and two years later senator of the United States, serving from 1877

to 1885. President Cleveland appointed him attorney-general of the United States in 1885, in which capacity he served until March, 1889, when he engaged in the practice of law in Washington, D. C.

GARLIC (gär'lĭk), a perennial plant allied to the onion, composed of a compound bulb of ten or twelve smaller ones, called cloves.



GARLIC.
a, Stalk; *b*, flower; *c*, bulb; *d*, clove.

The plant has long, pointed leaves, quite narrow and flat, and whitish or pinkish flowers, similar to those of the onion. It is indigenous to the southern part of Europe. In some countries it is cultivated extensively, especially in Portugal, where peasants eat slices of it with bread. Most species have a highly pungent taste and a disagreeable odor. In medicine it serves as a stimulant, expectorant, and diuretic, but its mildness renders it useful as a diet rather than as a medicine.

GARNET, Henry Highland, Negro clergyman, born a slave in Kent county, Maryland, in 1815; died in Monrovia, Africa, Feb. 14, 1882. He succeeded in reaching the northern states at an early age and engaged as a school teacher in Troy, New York. In 1842 he was licensed as a minister of the Presbyterian Church, and served as pastor in Troy about ten years. He lectured on slavery in Europe from 1850 to 1853, engaged as a United Presbyterian missionary of Scotland to Jamaica, and shortly after returned to the United States. In 1855 he became pastor in New York City, where he won a large circle of friends. He was chosen president of Avery College in 1869. In 1881 President Garfield appointed him consul-general to Liberia, where he died.

GARNET (gär'nĕt), a class of minerals, including various species that are prized highly. They occur usually in mica-slate or in gneiss, but sometimes in limestone, granite, or in serpentine and lava beds. There are three leading varieties of garnet, including alumina garnet, iron garnet, and chrome garnet. These vary in color, such as red, brown, green, black, and yellow, according to the amount of coloring oxides contained. Some iron garnet contains enough metal to be attracted by the magnet. Garnets are found in Brazil, Peru, Ceylon, Bohemia, Siberia, and in many mountainous districts, the finest being the Syrian. Common garnet is often powdered and used for cutting and polishing other stone.

GARONNE (gä-rōn'), an important river in the southwestern part of France, rises in the Pyrenees at an altitude of 6,142 feet above sea-level and flows toward the northwest, discharging into the Atlantic. It receives numerous tributaries, among them the Save, Lot, Baise, Ratz, and Dordogne, and, after forming a junction with the latter, is called the Gironde, a distance of about fifty miles, where it constitutes an important estuary. The basin of the Garonne includes 22,050 square miles, is fertile, and contains numerous thriving commercial centers. The Central Canal joins the Garonne at Toulouse, and unites it with the Mediterranean Sea, thus forming an important connection between that and the Atlantic. Several other canals also join it, one of which crosses the river at Agen by a viaduct.

GARRET, John Work, financier and railroad president, born in Baltimore, Maryland, July 31, 1820; died Sept. 26, 1884. He was interested in railroad enterprises and steamboat navigation, serving as president of the Baltimore and Ohio railroad from 1858 until his death. His son, Robert Garret, was born in Baltimore, April 9, 1847; died July 29, 1896. He held various offices in the railroad system established by his father, and after the death of the latter succeeded to the presidency. His mind became partially unbalanced on account of the reverses following the purchase of the Baltimore and Ohio telegraph lines by Jay Gould. His sister, Mary Elizabeth, became known as a philanthropist and promoter of higher education among women. She donated liberally to Bryn Mawr College, and in 1892 aided in establishing a medical college in connection with Johns Hopkins Hospital by contributing about $300,000.

GARRICK (gär'ĭk), **David,** actor and dramatist, born in Hereford, England, Feb. 20, 1716; died Jan. 20, 1779. He was educated at the grammar school of Lichfield. In 1735 he took a course of six months under Samuel Johnson, and shortly after both teacher and pupil settled at London. Garrick studied law and engaged as a wine merchant, but soon after went upon the stage and began to play as a professional actor in 1741. His early successes caused him to appear in London, where he played successfully in the character of Richard III., and soon after

attained success by attracting the attention and applause of large audiences. He became manager of Drury Lane Theater in 1747, two years later married, and continued to direct the Drury Lane entertainments until he retired from the stage in 1776. A trip to Italy in 1763 was the only vacation period taken from his busy field of labor, and this he turned to good advantage by writing a humorous pamphlet and devising projects by which his work might be more highly popularized. Garrick ranks as one of the most noted English actors, possessed much tact for natural display, and gave a touch of happiness and beauty to his presentations. His written pieces include about forty, but most of them are adaptations from other plays. The fortune amassed by him was valued at $700,000 at the time of his death.

GARRISON (găr'rĭ-son), **William Lloyd**, journalist and abolitionist, born in Newburyport, Mass., Dec. 10, 1805; died in New York, May 24, 1879. He was apprenticed to a shoemaker at Lynn in 1814, but soon after entered school at Newburyport, where he worked out of school hours to pay his expenses. He commenced to learn cabinet-making in 1818, but some time after engaged as printer on the "Newburyport Herald," and when only sixteen years old began to arouse interest by writing on the slavery question. He became editor of the "Herald" in 1824, and was among the first to publish poems from the pen of Whittier. Later he edited the "Free Press," and in 1827 conducted the editorial work on the "National Philanthropist," the first temperance journal published in America. In 1829 he aided in organizing the "Genius of Universal Emancipation," in which he denounced the slave trade in such outspoken words that he was imprisoned for libel. After being released, he went on the platform as an anti-slavery orator, founded the "Liberator" in 1831, and the next year the American Anti-Slavery Society, of which he afterward became president. He visited European countries on a lecturing tour, where he was welcomed by many of the liberal thinkers. His "Thoughts on African Colonization," published in 1832, extensive lectures, and editorial work had a marked influence upon public opinion regarding slavery. The principles advocated by him rapidly gained in popularity until in 1865, when slavery was abolished and the Anti-Slavery Society dissolved. His friends presented him with $30,000 in recognition of valuable services. A number of poems and selections were published by him.

WILLIAM LLOYD GARRISON.

GARTER, Order of the, one of the most celebrated and ancient orders of knighthood. It was probably originated by Edward III. about Jan. 18, 1334, and served to reward the distinguished military personages who assisted in the struggle against France, though its founding is sometimes assigned to Richard I. It is related that Edward III. was dancing with the countess of Salisbury when her garter dropped, and, after putting it around his own leg, restored it with the expression of "Dishonored be he who thinks evil of it," which afterward served as the motto of the organization. Numerous revisions of the statutes of the order were effected in the reigns of Henry V., Henry VIII., Edward VI., and in 1805 under George III.

Originally there were twenty-six knights, inclusive of the sovereign, who was the recognized head. The statute passed in 1786 recognized and maintained this number, but admitted as supernumerary members certain of the princes. The common title of the order was "Order of St. George" prior to the reign of Edward VI., and the same term is still applied synonymously with that now used. A dark-blue ribbon, edged with gold, is used to represent the garter as the emblem. On it the motto appears, together with a buckle and pendant. It is worn below the knee of the left limb. However, there are other marks of distinction, such as a hood, mantle, gown, plume, star, ribbon, golden collar, and a figure of St. George on horseback in contact with the dragon. The members use the initials K. G. to designate the order, which are written after their names. From some authorities we learn that ladies were members prior to the reign of Edward IV. The prince of Wales is a member by virtue of his title.

GAS, one of the three forms of matter, the other two being solids and liquids, and which constitutes a fluid that cannot be liquefied nor solidified at ordinary temperatures and pressure. Air was practically the only gas known to the ancients, but artificial gas was referred to as spiritus by writers as early as the 14th century A. D. The term gas came to be applied to all elastic fluids that differ from common gas, and which were thought to be permanent. However, Faraday liquefied various gases by reducing the temperature and increasing the pressure, and since then the term has been applied generally to all substances in an elastic aëriform state. Experiments in liquefying gases have established the fact that none is permanent, and that even air may be reduced to a liquefied state, this being first demonstrated in 1878. To reduce a gas to a liquid state it is necessary to make application of cold or pressure, or a combination of both. The point at which the distinction between a gas and a liquid is lost is called the critical point of temperature, and there is a partic-

ular temperature for any given pressure at which the critical point of temperature can be reached. It is only at or below this particular temperature that pressure converts a gas into a liquid.

Gases are generally distinguished from liquids by the term elastic fluid, while liquids are termed non-elastic fluids, this being due to the circumstance that liquids have comparatively little or no compressibility. Though all liquids have elasticity, they expand after compression is removed to their former state, while gases expand to an indeterminable extent and in every direction when left unconfined. As a general rule the density of a gas depends upon the pressure to which it is subjected, or, in other words, an increase of pressure reduces the volume of gases proportionally. This is in accord with the law announced by Edme Mariotte (1620-1684), a French physicist, which is substantially as follows: The volume of a given mass of gas varies inversely with the pressure to which it is subjected. Two or more gases brought into contact mix in any proportion and diffuse themselves uniformly regardless of their gravities. This may be verified by filling a bottle with hydrogen and another with oxygen, whose specific gravity is sixteen times that of hydrogen, or with carbonic acid, whose density is twenty-two times as great, and connecting the two bottles with a glass tube about ten inches long. Diffusion of the gases will begin at once, and within a few days they will be found to have the same proportion to each other in both bottles, even if a porous substance, as a thin membrane, be placed in the tube. The kinetic theory of gases accounts for the power of motion inherent in all parts of aëriform matter. According to it a gas consists of molecules sparsely distributed through space, but which move about with much velocity. An increase of temperature has the effect to greatly increase the molecular energy, when the pressure within the vessel will be increased correspondingly, while lowering the temperature has an opposite effect.

Gas is a valuable agent in lighting, heating, and for various other purposes in the arts and industries. Large quantities are derived from natural sources, but the greater supply is obtained from coal, wood, resin, peat, water, coke, oils, and fats. In many localities gas issues from the surface of the earth, as in Pennsylvania, Texas, Ohio, New York, and various parts of Eurasia, especially at Baku, and is now used very extensively for illuminating and heating purposes. The Chinese have utilized gas for centuries in various industries, and even transported it to different parts of their own country, which they did in bamboo tubes. It may be said that the artificial manufacture of gas in Europe dates from 1739, when an inflammable gas was obtained in England by subjecting coal to heat in a closed vessel and conducting the fluid through a small tube into bladders. A simple experiment consists of placing particles of bituminous coal in the bowl of a tobacco pipe, then closing the top with moist clay and heating to a red heat. When reaching the point of distillation, a yellowish smoke issues from the stem of the pipe, which yields a bright flame when lighted.

In the manufacture of coal gas the coal is placed in an iron or clay retort, in which it is heated until it expands to twice its bulk and forms coke, while the gas generated is conducted by a pipe into a receiver. The tanks used in factories have a large capacity, some having storage room for 3,000,000 cubic feet of gas. In distilling the coal it gives off heat, steam, ammonia, tar, and gas. The ammonia and tar are run off into cisterns, while the gas is passed over lime before running it into gas storage tanks for the purpose of freeing it from acids.

In an analysis made by Robert W. Bunsen (q. v.) it was found that the products of the destructive distillation of bituminous coal include the following: Coke, sixty-eight per cent.; tar, twelve; water, eight; marsh gas, seven; carbonic oxide, one; carbonic acid, one, and small quantities of olefiant gas, hydrogen, ammonia, and nitrogen. Coal gas is used largely for heating and lighting, and for that purpose is passed to houses and factories by pipe lines. Small pipes carry the gas to lamps and burners in different parts of the buildings. A gas meter, through which the gas passes, is usually in each building, and the quantity consumed is measured quite accurately.

Wood gas contains more illuminating power than olefiant gas, and its specific gravity is greater than coal gas; hence, it requires burners with larger orifices. Resin gas has a high illuminating power, but the supply is necessarily limited. Peat gas is distilled in retorts similar to those used in wood gas. Water gas is made by forcing steam to retorts containing red-hot coal or water, and oil gas by dry distillation. Crude petroleum is also used extensively in making gas for illuminating purposes. See **Natural Gas**, **Acetylene**, etc.

GASTRIC JUICE (găs'trĭk), a colorless liquid secreted by the stomach, containing 98.5 per cent. of water. It has a salty, acid taste, the active principle being pepsin. The function of gastric juice is to dissolve the nitrogenous elements of food, such as albumen, fibrin, and casein. It also affects portions of the vegetable food and all animal food, except fat, converting them into what is known as peptones. The acid in some cases seems to be largely of a hydrochloric nature. In others hydrochloric and lactic, or even butyric and acetic acids are present, but they are thought to be due to the change undergone by the food in the process of digestion. About fourteen pounds of gastric juice are secreted daily in the human

adult. Artificial gastric juice can be made by extracting pepsin from the coat of the stomach of animals by means of glycerine, and adding water to the filtered liquid, with a small per cent. of hydrochloric acid.

GARY, James Albert, successful business man, born in Uncasville, Connecticut, Oct. 22, 1833. He descended from Puritan ancestors, settled in Maryland in 1840, and was educated at Rockhill Institution and Allegheny College. He entered a partnership with his father in the milling business in 1861, and on the death of the latter, in 1870, succeeded to the head of the business at Alberton, Maryland. At the time of the Civil War he was an ardent supporter of the Union. He attended all the national republican conventions since 1872, serving on the general committee of that party. President McKinley appointed him postmaster-general in 1897, but he resigned the following year, being succeeded by Charles Emory Smith.

GATES, Horatio, American general, born in England in 1728; died in New York City, April 10, 1806. In 1755 he came to America, serving as captain in Braddock's expedition, and was severely wounded in the engagement that followed. In the early Revolutionary movements he became a prominent factor for American independence, when he was appointed adjutant-general in the colonial army, and gained a decisive victory over the British at Saratoga in 1777. This success was followed by the surrender of Burgoyne, and is classed by Edward S. Creasy (q. v.) as one of the great battles treated in his "Fifteen Decisive Battles of the World." Though he managed the campaign with much ability, at least a part of the glory belongs to Schuyler. Shortly after he entered upon a scheme whereby he hoped to secure general command of the colonial army, a position held by Washington. The design was discovered and he was relieved of his command until 1780, when he was made a commander of the southern forces and sustained a severe defeat at Camden, on August 16. This led to his retirement, and a court-martial, after investigating his conduct, did not acquit him from blame for the defeat until in 1782. In 1784, after freeing his slaves, he settled in New York City, where he resided until his death.

GATLING (găt'ling), **Richard Jordan**, inventor, born in Hertford county, North Carolina, Sept. 12, 1818. He turned his attention to inventions at an early age, completing a screw for propelling steamers in 1838 and later a seeder for sowing wheat and rice. In 1850 he invented a hemp-brake, a steam plow in 1857, and later a machine for transmitting power by means of compressed air. His invention of the revolving battery that bears his name is the most noted of his productions. It consists of a number of breech-loading rifled barrels constructed to revolve around a common center. Cartridges are supplied by an ingenious device, making it possible to fire 1,200 shots per minute from a ten-barreled gun. The United States adopted it in 1866, and it has also been used by several European governments. Among his more recent inventions are a torpedo and gun boat, an improved method for casting large steel cannon, and a superior pneumatic gun for discharging high explosives. He died Feb. 26, 1903.

GAUL, or **Gallia**, the name applied anciently to the country situated between the Rhine and the Pyrenees, which was the region chiefly occupied by the Gauls, the most numerous branch of the original Celts. The principal divisions of the region consisted of the district on the Roman side of the Alps and the one beyond the Alpine Mountains. In the course of time the former became known as Gallia Cisalpina, and the latter as Gallia Transalpina, though each was variously modified in extent by the fortunes of war and insurrectional disturbances. The Gallic people were first brought into history about 397 B. C., when they crossed the Alps and engaged in a series of wars with the Etruscans and Romans. In 390 B. C. they inflicted a defeat upon the Romans at Allia, burned a large part of Rome, and planted their authority far toward the East.

In about 280 B. C. the Gauls conducted successful campaigns into Greece, penetrated across the Hellespont into Asia Minor, and made important settlements under the name of Galatians, with which the early Christian teachers came in contact. Their foothold along the Danube was lost as a result of the conquests of the Germanic peoples, who occupied the entire region tributary to the Rhine. The Cisalpina Gauls were prominent factors in contending against Roman power until the first Punic War, when an armed conflict of six years' duration compelled them to submit to the Roman authority, in 220 B. C. The march of Hannibal across the Alps to reduce Rome gave them an opportunity to again rise with prospects of success, but, when the Carthaginians were defeated by the Romans, the Gauls were again reduced to submission. A Roman invasion in 128-122 B. C. reduced and made them tributary, the Romans establishing Provincia, a name since perpetuated as Provence. Later the successful incursions of Germanic and Cimbrian armies tended still further to reduce the Gaulish tribes, and they were ultimately subdued by the Romans in a war lasting nine years, conducted under the proconsulship of Julius Cæsar, from 58 to 50 B. C.

GAVAZZI (gä-vät'see), **Alessandro**, patriot and evangelist, born in Bologna, Italy, March 21, 1809; died in Rome, Jan. 9, 1889. In 1825 he entered the order of Barnabites and became professor of rhetoric in the University of Naples, where he gained a reputation as an orator. Soon after he was made chaplain-general of the liberal forces

by Pope Pius IX. Later the pope joined the reactionaries and recalled the Roman legion from Vicenza, which caused Gavazzi to seek safety in Genoa. When the republican government was established, the pope fled from Rome and Gavazzi returned, but escaped to London when the French captured Rome in 1842. While in Britain he lectured against Romanism. Subsequently he visited the United States and Canada, where his orations against the Roman government gave rise to numerous riots. In 1860 he joined Garibaldi in his efforts to establish the Free Church in Italy, revisited England in 1870, and made an extensive tour of the United States in 1873. Among his publications are "Recollections of the Last Four Popes;" "New Union with Rome," and "The Priest in Absolution."

GAY, John, celebrated poet, born in Devonshire, England, in 1688; died Dec. 4, 1732. He descended from an ancient family, was apprenticed to a London silk-mercer, and in 1711 published a descriptive poem dedicated to the pope. Among his productions are numerous operas, sonnets, and oratorios, the most celebrated being the "Beggar's Opera," which was given sixty-three nights consecutively with excellent effect. Among other productions are "Wife of Bath;" "Three Hours After Marriage;" "Black-eyed Susan," and "Polly." His works were not only popular, but brought good returns to the author, "Polly" alone netting him $6,000.

GAZELLE (gȧ-zĕl′), the type of antelopes, including about twenty species, most of which frequent desert and mountain regions.

GAZELLE.

They are found mostly in North Africa, Persia, and Arabia. The various species are gentle in disposition, light fawn colored, and have lustrous eyes. Both sexes have horns. The gazelle is preyed on by the lion and hunted for its flesh and hide. Though gregarious in habits, they are shy and difficult to approach.

GEAR, John Henry, statesman, born in Ithaca, New York, April 7, 1825; died July 14, 1900. In 1838 he removed to Iowa, engaged in business at Burlington in 1843, and became mayor of that city in 1863. Subsequently he was elected to the general assembly of the state three different times, and served as speaker of the house two terms. In 1878-82 he was governor, being elected as a republican. He was elected to congress in 1886, to which position he was re-elected in 1888 and 1892. On account of his eminent service in the house, he succeeded to the election of United States senator in 1895. He was re-elected to the senate in 1900, but died before entering upon the service of the second term, and was succeeded by J. P. Dolliver.

GEARY, John White, soldier and statesman, born near Mount Pleasant, Penn., Dec. 30, 1819; died in Harrisburg, Feb. 8, 1873. After studying civil engineering and law, he enlisted in the Mexican War; attained the rank of lieutenant-colonel for valuable services rendered in the field, and was made the first commander of the city of Mexico and colonel of his regiment. He was appointed first postmaster of San Francisco in 1849, became mayor of that city in 1850, and was made territorial governor of Kansas in 1856. When the Civil War commenced, he raised the twenty-eighth Pennsylvania volunteers, commanding in the battles of Chancellorsville, Gettysburg, and Lookout Mountain, and accompanied Sherman on the march to the sea. By reason of distinguished services he succeeded to the rank of major-general. The republicans elected him governor of Pennsylvania in 1866, which position he held until within two weeks of his death.

GEHENNA (gē-hĕn′nȧ), in Hebrew, the valley of Hinnom, a gorge with precipitous and rocky sides, situated a short distance southwest of Jerusalem. The Jewish kings made it a favorite place for the celebration of religious ceremonies and idolatrous rites. When the pure religion of the fathers was restored in the reign of King Josiah, he defiled the valley in making it a charnel district by covering it with the sewage of the city. It was also common to burn the offal and carcasses of animals in order to make the place one of disagreeable repute and thereby destroy it as a resort for idol worship.

GEIJER (yī′ẹr), **Eric Gustaf,** poet and historian, born in Vermland, Sweden, Jan. 12, 1783; died April 23, 1847. He studied at the university of Upsala and in Stockholm, and later secured a professorship of history in the former. Besides efficiently instructing the university classes, he was a prolific writer of political essays and poems, lec-

tured extensively and completed numerous musical compositions. In his historical researches he was supported liberally by persons of influence, and exhibited much resource and method in collecting information, though his writings are confined largely to Scandinavian countries. Among his most celebrated works are "Swedish National History;" "Gustaf III," and "Collected Works." The last named constitutes a general collection and was published since his death by his son, together with biographical sketches.

GEMS, the name of precious stones, sometimes found with a natural polish and crystallized in regular shapes, but more commonly with a rough surface and of irregular form. The term is applied particularly to a stone cut and finished ready for setting and wearing as an ornament, as the ruby, sapphire, diamond, and emerald. There are others used for ornament to which the term does not properly apply, such as carnelian and agate. The manufacture of artificial gems has made notable progress in recent times. A kind of glass known as paste or strass, which contains about fifty per cent. of oxide of lead and is peculiar for its brilliancy and hardness, is a common base for artificial gems. There also has been some progress in attempts to make true gems artificially. These consist largely of rubies, sapphires, and others of the corundum class.

GENESEE (jĕn'ę-sē), a river of western New York, having its source in Potter county, Pennsylvania, and, after coursing northward into New York, discharges into Lake Ontario, seven miles north of Rochester. The total length is 140 miles. It passes through a fertile valley, has falls at Portage and Rochester, and is navigable for small craft about fifty miles.

GENEVA (ję-nē'vą), a city of Ontario county, New York, on Seneca Lake, about fifty miles northeast of Rochester. Among its municipal facilities are pavements, street railways, electric lights, waterworks, and a library. Besides being the seat of excellent schools, it contains Hobart College, the agricultural experiment station, the Delancey Divinity School, and the Delancey School for Girls. Among the manufactures are steam heating apparatus, clothing, scientific instruments, machinery, engines, and boilers. The surrounding country is agricultural and contains many thousand acres cultivated in nurseries, which give employment to 1,200 men and produce annually stock valued at about $1,000,000. Population, 1900, 10,433.

GENEVA, Lake of, or Lake Leman, a beautiful fresh-water lake between France and Switzerland, though the larger part of it belongs to the latter country. It is formed as a crescent, has a length of forty-eight miles from east to west, and is 1,215 feet above sea-level. The area is 225 square miles, the greatest breadth nine miles, and the maximum depth 980 feet. It is rich in fish, especially trout, pike, salmon, and German carp. The lake is valuable in navigation, being never entirely frozen over in winter. It is entered from the upper end by the Rhone, which pours its turbid and silt-laden water into it, but passes from it clear and transparent. Near the lake are the mountains of Savoy, while Mont Blanc is visible, though sixty miles distant. The city of Geneva is situated at the point where the Rhone River flows from the lake. Many adjacent localities are celebrated in literature, among them the places treated by Rousseau and Schiller. Byron in "Childe Harold" and "The Prisoner of Chillon" has added interest to the lake.

GENEVA, an important city of Switzerland, capital of the canton of the same name. It is situated on the western shore of Lake Geneva, at the point where the Rhone issues, and is connected with European cities by extensive railroad systems. Though originally a Gallic city, it was afterward included in the Roman Provincia, and later passed to the Burgundians and Franks. In the 12th century it witnessed the controversies between the bishops, who were feudatory to the German Empire, and the counts of Savoy, each striving for supremacy. During these contentions the citizens secured numerous advantages, among them religious and political liberties and commercial independence. An alliance was concluded with Freiburg in 1518, and subsequently with Berne, thus making Geneva an important member of the Swiss Confederation. In the Reformation it was a seat and stronghold of Protestantism, becoming so largely under the preaching of William Farel and Calvin. Besides impressing the people with rigid morality, these teachers awakened a taste for the exact sciences. The aristocratic party continued to oppress the people for centuries, but in the 18th century the popular party gained much strength, but the contests that followed might have ended even more dangerously to the people if France and the adjacent cantons had not interfered. France annexed it in 1798 as the department Du Leman, but, with the overthrow of Napoleon in 1815, it became independent and formed the twenty-second canton of the Swiss Confederation.

The city is located on both sides of the lake, though the larger portion is on the south bank of the Rhone, over which several excellent bridges cross and facilitate free public intercourse. The two portions of the city are known as the upper and lower the former containing excellent edifices and beautiful hotels, while the latter is the seat of the commercial institutions, manufactories, and the residences of the poorer classes. Among the manufactures are gold, silver, and other metal wares; silk, cotton and woolen goods, leather, calico, hats,

musical instruments, clocks and watches, machinery, and chemicals. Of these jewelry, musical instruments, and watches are of much the greatest importance. Public transportation is conducted by steam navigation on Lake Geneva, the Rhone, and numerous canals, besides many electric railway lines that center in the city. As a seat of science and literature Geneva takes high rank, its institutions of learning, libraries, museums, and galleries of art ranking with the most famous of Europe. Among the eminent men who resided at Geneva and influenced its learning are Calvin, Knox, Necker, Rousseau, Beza, Sismondi, and Huber. Its cathedrals, public parks, electric lighting system, and statuary take high rank. The university was founded in the 12th century. It carries advanced courses of study and is attended by 875 students. Population, 99,560.

GENGHIS KHAN (jĕn'gĭs kän), originally known as Temujin, celebrated Mongol conqueror, born in Deligum, near the north bend of the Hoang Ho River, Jan. 25, 1155; died Aug. 24, 1227. He descended from a celebrated Mongol chief, and when thirteen years of age was selected to rule over a number of clans, known as the tribe of Neyrun, which occupied the region between the great wall of China and the Amur River. Being ambitious for conquest, he freed his tribe from paying tribute to the khan of East Tartary, organized a large army, and in 1203 conquered the dominion of Toghrul and subsequently extended his dominion from the Pacific Ocean to the Black Sea. His military conduct was so successful and his efforts so well directed that he subdued the Turkish Confederacy, Nayman, the Chinese possession Tangut, and the North Chinese Empire. Several detachments of his vast army carried the campaign as far west as the Crimea, where they established his supremacy, and later returned through the valley of the Volga. His possessions were divided among his children after his death, and traces of his power and influence remained a number of centuries. In religion he was a Mohammedan, though he tolerated other forms of worship, punished crime, exacted taxes for the support of his army, and established a system of postal communication throughout his dominion. Eastern chroniclers maintain that he patronized learning, exhibited marked respect for scholars and architects, and that his civil authority was efficient in protecting the life and property of his subjects.

GENII (jē'nē-ī), in Roman legends, the deities corresponding to the Dæmon of the Greeks, and serving to protect all created things and beings from their origin. Each individual person was thought to be accompanied by a Genius from the hour of his birth. In this way he was prompted to good and noble deeds, and the Genius, as a guardian angel, comforted him in sorrow and guided him throughout his earthly career. Cakes, wines, and incense were offered to the Genii as sacrifices on birthdays. The Greeks believed the Dæmons to be the spirits of the righteous that had lived in the golden age, and that they watched over mankind and carried prayers and gifts to the gods.

GENOA (jĕn'ọ-ạ), an important Mediterranean seaport city of Italy, on the northern shore of the Gulf of Genoa, at the foot and on the slope of the Ligurian Alps. Extensive fortifications surround the city and crown the heights near it. The older portions have narrow streets with lofty buildings, while those of the newer part are spacious and regularly platted and beautified by magnificent edifices and beautiful palaces. Splendid orchards and groves of pomegranate and orange trees cover the hills adjacent to the city, and above them rise lofty ranges of towering mountain peaks. The harbor is protected by piers and moles, and is studded with innumerable vessels that carry on an important navigation trade in fruits, cereals, minerals, and manufactured articles produced in the city and surrounding region. Among the manufactures are Italian marble, macaroni, paper, ironware, machinery, cheese, flour, jewelry, gloves, textile fabrics, and scientific instruments.

Many of the buildings are famed in history, among them the cathedral of St. Lorenzo, built in the 12th century; St. Stefano's; Theater Carlo Felice; several splendid theaters; the palaces of Balbi, Doria, Serra, and several others. The city has a well organized public school system, schools of fine arts, a military school, the Royal Marine School, a theological seminary, and the celebrated University of Genoa. The university contains a library of 125,000 volumes, supports extended courses of study, and is attended by 1,125 students. In the public parks and palazzos are numerous forms of decoration and statuary, among them several fine marble statues of Columbus. The St. George bank building is used as a custom-house, and was anciently one of the most stable banks of deposit and circulation in Europe. Its celebrated cemetery, known as Campo Santo, is remarkable for its beauty and the large number of eminent men whose graves it contains. The city is beautified by modern lighting, has electric street railway service, important railroad connections and is noted for its large commercial and passenger traffic.

Genoa was famous as a seaport under the Romans. It was organized as an independent republic and presided over by doges subsequent to the division made by Charlemagne. Saracen incursions in 935 led the Genoese to form an alliance with Pisa, though in 1119 the two cities engaged in wars and continued hostile till 1294, when Pisa was given a crushing defeat. In the

meantime Venice had risen as a successful rival, which led to periodic wars from the 12th to the 14th centuries, and, after discordant strife internally, it became subject to Milan and later to France. Napoleon secured permanent possession of Genoa after the battle of Marengo, in 1800, and formally annexed it in 1805. In 1815 it became a part of the kingdom of Sardinia, and with it was merged into the kingdom of Italy. Historically, the Genoese are noted for their excellent spirit of liberality and enterprise. They fostered learning, encouraged industrial arts, established civil reforms and built internal improvements. The annexation to Italy within recent times has given the city its present prosperity. Population, 216,250.

GENSERIC (jĕn'sẹr-ĭk), celebrated king of the Vandals. He obtained possession of the throne of Spain with his brother Gonderic, and, after the death of the latter, became sole ruler. In 428 A. D. he organized an army of 50,000 men, crossed the Strait of Gibraltar the following year for the purpose of assisting Bonifacius, Roman governor of Africa, and was resisted by the incursions of the Moors. Soon after he conceived the idea of claiming the African possessions of the Romans, and accordingly defeated Bonifacius and founded a kingdom in 439, with Carthage as the capital. Later he conquered Sardinia, Sicily, and Corsica, and laid the conquered regions waste with such destruction that Vandalism is still synonymous with barbarism. The Vandals built a vast fleet with which they controlled the Mediterranean and captured Rome in 455. They destroyed two Roman expeditions sent against them—the first by Majorian, the western emperor, and the second under Leo, the eastern emperor. Genseric died in 477, reputed the greatest of the Vandal kings, and, according to accounts, was regarded as a scourge of God.

GENUS (jē'nŭs), in scientific research, a classification of plants or animals embracing one or more species, closely agreeing in certain characteristics by which they are distinguished from all others. The term applies to forms subordinate to order, tribe, and family. A genus may be constituted of a single species, as the giraffe, which possesses certain characteristics belonging to no other species. In others there are several or many species. To illustrate, the mus constitutes a genus containing such animals as the mouse and the rat, which differ in size and are clearly distinct species, but still have a similarity of structure obvious to all. Among plants the rosa includes the various species of the rose.

GEOGRAPHICAL DISTRIBUTION (jē-ō-grăf'ĭ-kal dĭs-trĭ-bū'shŭn), the term applied to the diffusion of animals and plants in the different regions by natural and artificial means. For centuries the view was held that all species of both the vegetable and animal kingdoms were created within the geographical regions to which the different forms were common, but, when the idea came to be held that species are allied and that they originated from a common source, the implication gained widespread foothold that the ancestral stock had a definite birthplace, and from this the various kinds were distributed widely to different provinces and regions. In studying the distribution of plant and animal life it is essential to investigate the means for diffusion and the natural barriers that offer effective obstacles against migration. Animals possessing much power of locomotion, such as fishes, birds, and many land animals, may become easily dispersed to the most remote regions of the continents, and in many cases to adjacent grand divisions.

It is of interest to note that with one exception the mammals of North America are allied to those of the West Indies. From this we may infer that the ancestors of the West Indian animals inhabited the American continent, and that, by some means, they secured passage to those islands. It is likewise interesting to note that the marsupials are confined wholly to America and Australia; that the tapirs are found only in South America and the Malay Islands; that there is greater difference in the flora of the Pacific coast of North America and Japan than between that of the latter country and the Atlantic coast plain, and that the birds of North America are more closely allied to those of Europe than the varieties common to South America. Similar remarkable instances of distribution may be alluded to in relation to various regions of the continents and oceans, each showing a remarkable dispersement in latitude and longitude of the different forms of life, all, of course, being attributable to some natural cause either clearly known or inferred.

The means to facilitate distribution are quite various and their effectiveness depends more or less upon divers circumstances. In the scope of this article it is possible to call attention only to the more important, since the subject is one which may be treated more properly in works especially designed to throw light upon the various phases, such as Wallace's "Geographical Distribution of Animals," Engler's "Distribution of Plants Since the Tertiary Period," and Darwin's "The Origin of Species." Besides normal facilities to disperse, various means must be taken into account. Seeds of many classes of plants become widely diffused by winds carrying them to regions remote from their native locality, especially those provided with feathery appendages; while animals, insects, and the movements of water by waves, currents, and streams largely transport and disperse them. Oceanic currents likewise carry animals to remote regions, especially in the polar vicinities by ice-floes and icebergs. The

branches and trunks of trees frequently carry animals and seeds long distances down streams, across straits, and even over extensive bodies of water. Fur-bearing animals often disperse seeds that cling to the fur; likewise birds of plumage carry them to distant regions. Aquatic birds transport the spawn of amphibian animals and plants to remote districts and fresh-water bodies, as well as shell-fishes, seeds of marine plants, and various forms of marine life. It is certain that wide distribution has been effected by seeds clinging to the hoofs of animals and to insects driven by strong winds, and often unintentionally by man.

Among the barriers against rapid and wide diffusion are climatic conditions, elevated mountain ranges, and vast expanses of water surface. It is quite certain that a large per cent. of the general distribution, as existing in recent times, was effected by the sinking of islands and continents, thus detaching a portion of the land masses and with it its proportional share of animal and plant life, such as was likely effected by the detachment caused by the sinking of large areas of the Pacific, thereby forming the great archipelago southeast of Asia and other island groups equally noteworthy. The more recent diffusions, however, were effected by migration, which doubtless occurred in the usual manner by marine life passing over isthmuses, and land forms, including both plants and animals, being carried across straits and narrow channels of water. The most important and widespread distribution of valuable animal and plant life is due to the commercial designs of man. As a source of profit the various domestic animals and highly cultivated cereals, vegetables, and other plants have been carried to climates and latitudes agreeable to their production and use.

GEOGRAPHICAL SOCIETIES, the organizations formed to obtain and disseminate geographical knowledge. In 1821 the first important association to promote and extend geographical knowledge was organized in Paris, known as the Society of Geography, which founded the "Bulletin of the Society of Geography" in 1822. The celebrated German Association of Geography was founded in Berlin in 1828, and its proceedings are published annually in "Reports of the Berlin Association of Geography." Among the societies devoted to the study of geography is the American Geographical Society, founded in New York in 1852.

GEOGRAPHY (jē-ŏg'rȧ-fy), the science that treats of the earth. As a study it is pursued under four departments or branches —mathematical, political, physical, and commercial. Mathematical geography is that branch of the general science which treats of the earth in its relation to the solar system, and forms the true basis for accurate geographical knowledge, since by means of it we are enabled to form clear conceptions of the laws governing terrestrial phenomena. Through its agency we learn of the location of the earth in space; its form, size, and movements; its divisions by lines and circles imagined to be drawn, and the method of representing portions of it on maps. Political geography embraces the description of the earth in relation to government and societies of mankind. It treats of the manner of life of the people, and of their civilization and government. Physical geography is a treatise of the physical condition of the earth, its relation to nature and the natural laws by which it is governed. It treats especially of the atmosphere, the natural divisions of land and water, the aërial currents and movements of oceanic waters, and the distribution of animate and inanimate objects found upon the surface of the earth. These are described not only in a given locality, but the causes of their existence and the natural results are discussed with a view of learning their causes and effects. Commercial geography includes an investigation of the products of merchantable commodities, migrations of plants and animals, routes of travel and transportation, and the natural laws that govern or facilitate commerce and commercial relations. In the scope of geographical institutions the student is brought in contact with various other branches, such as geology, history, astronomy, and zoology, though these are all separate sciences, the relationship serving principally to facilitate general advancement and to broaden culture in basic principles.

In ancient times geographical knowledge was necessarily limited because of insufficient means to navigate the vast expanse of ocean and proceed with any degree of rapidity across the continents. Besides, the absence of powerful offensive weapons of war prevented exploring parties from making material progress against the hostile peoples occupying distant and unexplored regions. The expanse of geographical knowledge is co-ordinate with that of explorations and discoveries effected by expeditions and vast cruising enterprises. Among the ancient geographers was Eratosthenes, who flourished about 240 B. C. Greater, however, were Strabo, who lived in the reign of Augustus and Tiberius, and Ptolemy, who flourished at Alexandria about 139 A. D. As a people the Phœnicians made the most remarkable geographical progress in early history. They not only explored the Mediterranean, but passed through the Strait of Gibraltar, cruised along the Atlantic coast of Africa and Europe, and made voyages as far south as the tropic of Capricorn and north to the British Isles.

Various views were held by early geographical writers, the earliest regarding the earth a disc with their own country forming the center, while the poems of Homer lead to the conclusion that the Greeks in the 9th century B. C. thought the earth to be a cir-

cular plane bounded by water and from which the various streams had their source. In the time of Alexander the Great geographical knowledge was extended by his famous expedition to the interior of Asia, and subsequently by cruises on the Indian and Mediterranean waters. Eratosthenes considered the earth a sphere and was the first to use lines to indicate latitude and longitude, and to employ mathematical principles in the construction of maps. Strabo, also mentioned above, wrote extensively regarding geography as understood in his time, and furnished valuable descriptions and drawings of the countries adjacent to the Mediterranean. Ptolemy prepared a geography of a large portion of Eurasia and Africa, including the British Isles, Germany, large parts of Russia and all the region between it and the Mediterranean. His geography also embraced northern Africa and large regions of western Asia.

The ancient geographers remained standard authority during the Middle Ages, and new material of note was not added until the extensive voyages of Marco Polo in the 13th century, who published the first accounts of Japan and the East Indies. However, the discovery of America in 1492 by Columbus; the doubling of the Cape of Good Hope in 1497 by Vasco da Gama; the discovery of Tierra del Fuego in 1520 by Magellan, with contemporary discoveries and explorations, gave geography an enlargement and interest not previously known. Other achievements worthy of note in this connection are the extensive explorations of Vasco da Gama in eastern Africa and southern Asia; the expeditions of Frobisher in 1576; of Davis in 1585; of Hudson in 1607, and of Baffin in 1616, all of which led to the enlargement of accurate knowledge. The Dutch navigators Tasman and Van Dieman made fruitful explorations in the Pacific about the middle of the 17th century and added Australia to the explored portion of the earth. Subsequently Captain Cook explored innumerable islands in the Pacific.

The explorations of the 19th century were devoted more largely to discoveries in the polar regions and the interior of Africa. Exploring expeditions were sent to the Antarctic regions from America, England, and France in 1840, when Victoria Land and the Antarctic continent were discovered. Another important discovery was that of the northwest passage around North America by way of Bering Strait and Baffin Bay. It was made in 1850 by an expedition under M'Clure. Among the most celebrated explorers to add knowledge of the interior of North America are Lewis and Clark, Humboldt, Spix, and Fremont, while the interior of Asia and Australia likewise became known largely in the latter part of the last century. The explorations and discoveries of interior Africa by such eminent men as Livingstone, Schweinfurth, Stanley, Bruce, Barth, and Rohlfs have led European nations to occupy practically the entire continent. They not only claimed the regions as colonial possessions, but constructed canals, founded cities and built vast railroad enterprises. Interior Asia is now in a fair way to become similarly controlled by European peoples. Not satisfied with their successes, the more ambitious are still making venturous exploits to the polar seas, and extensive excavations to determine complicated questions in physical geography. School text books are also assuming scientific completeness, and institutional instruction pedagogic worth. The schools of Germany have long led in both these important lines.

GEOLOGY (jē-ŏl'ō-jў), the department of natural science that treats of the present constitution and structure of the earth and the operations of its physical forces. It also investigates the history of geological formations in past ages, together with the causes and modes of physical changes, and the formation of inorganic and organic structures. The study of geology received attention many centuries ago, but it has taken high rank among the studies only since the beginning of the last century. Herodotus gave the subject much careful thought. He devoted studious consideration to the formation and fertility of the soil in Egypt, and traced their cause to the silt-laden waters of the Nile that overflow the delta and Lower Egypt periodically. Strabo flourished in the 1st century A. D., and ranked as the greatest of early geologists. He took up the discussion of the origin of fossils (q. v.), which long formed the subject of much controversy, and maintained that they were organic when entombed. Dr. Abraham G. Werner (1750-1817), professor in the school of mines at Freiburg, Germany, in 1775, gave modern geology its widespread interest. He held that a series of universal deposits had been formed by the action of a chaotic fluid, which evaporated and fell on the earth's crust in periodical succession and otherwise operated to erode and deposit silts. He also thought this action aided in cooling and thickening the crust, and effecting a marked influence upon the distribution of materials exuding from volcanic craters. In 1788 James Hutton published his "Theory of the Earth," in which he directed attention to the causes that now exist in producing formations, and held a contrary view to Dr. Werner in that he thought granite and basalt are of igneous origin.

There are at present three recognized schools of geology, those known as catastrophism, uniformitarianism, and evolutionism. Those holding to catastrophism maintain that there have been series of creations and catastrophies, life forms springing into existence and after a great lapse of time meeting with universal destruction, as in the deluge of Noah. Of this school Sir Roderick Murchison is a representative. Those hold-

ing to the theory of uniformitarianism think that causes now in operation alone constitute the reasons of all geologic phenomena. To this theory Sir Charles Lyell holds, and exemplifies it in his "Principles of Geology." He cites in support of his opinion the action of rivers, tides, currents, and ice as the causes of stratified rock and other formations, and directs attention to the action of volcanoes and earthquakes as agencies in producing igneous and metamorphic results; and states his belief that they are sufficiently potent to cause nearly every phenomenon witnessed in studying the earth's crust. Those holding to evolution (q. v.) accept all the theories of the uniformitarians, except those referring to the development of life forms. Of this school Darwin and Huxley are representatives, the latter assigning from 1,000,000 to 300,000,000 years as the time required for the production of the present conditions in geological phenomena.

It is probable that both the surface and interior of the earth were once highly heated, a condition probably still existing within the earth, and after cooling gradually formed a thin layer or crust at the surface. The lowest rocks, being of igneous or heat formation, are called igneous rocks, of which granite is an example. Owing to the presence of intense heat while forming, life could not exist, hence fossils do not abound. At that time the waters which now cover a large portion of the earth hung over the surface as dense vapor, but, as soon as a thin crust had formed, the cooling atmosphere tended to bring the vapor to the dew point and it fell to the surface in the form of rain. By continued cooling the crust became thicker, while contractions wrinkled the surface and caused portions to form dry land by emerging from the ocean. By the action of the water and that of heat and cold vast quantities of materials were broken up and ground into sand, clay, gravel, and other forms, which were carried to particular locations and stratified into strata of slate, sandstone, shale rock, and other common forms. These rock formations are known as aqueous or sedimentary, and contain more or less fossil remains. The heated interior long remained the seat of volcanic disturbances, which formed channels through the crust, and still give evidence of internal action and general contraction by occasional, though diminished, eruptions. The rocks modified by the action of heat are known as metamorphic.

Geologists make subdivisions of time based on the main rock systems, in each of which peculiar characteristics and organic remains, if present, have been studied and classified. These are shown in an ascending order in the following table:

LIFE PERIODS.	ROCK SYSTEMS.
Post-Tertiary or Quaternary	Recent—Alluvial, Peat, etc. Pleistocene.
Tertiary or Cenozoic	Pliocene. Miocene. Oligocene. Eocene.
Secondary or Mesozoic	Cretaceous. Jurassic { Oolitic. Liassic. } Triassic.
Primary or Palæozoic	Permian or Dyas. Carboniferous. Devonian and Old Red Sandstone. Silurian. Cambrian.
Archæan, Laurentian or Eozoic	Fundamental Gneiss.

The five principal periods or times are divided into ages in which the forms of life are classified in an ascending scale as follows:

Quaternary	The Age of Man.
Cenozoic	The Age of Mammals.
Mesozoic	The Age of Reptiles.
Palæozoic	The Age of Coal Plants. The Age of Fishes. The Age of Invertebrates.
Archæan	The Lifeless Age and Dawn of Life.

The Archæan time witnessed the dawn of life. It included an extensive era, and the temperature was so extremely high that life could not have existed. However, the simpler forms began to be created toward its close. The rocks of this period resulted from cooling of the molten mass of the earth and became the covering of the entire surface, including the regions below the ocean. On the older archæan rocks sedimentary rocks less ancient were deposited. At this period North America was largely submerged. Only portions in the vicinity of Lake Superior; the Iron Mountains of Missouri; the Blue Ridge range; the Wind River Mountains; the ranges farthest east in Colorado, and the New Jersey Highlands projected above the highly heated water. These portions constitute the oldest part of North America. It was within that time that iron was formed, the rocks of that period containing a large per cent. of iron ore. The Laurentian and Huronian are among the North American rocks that then existed; the former in the vicinity of the St. Lawrence, and the latter near Lake Huron, from which they were named.

In the Palæozoic time the animals and plants but slightly resembled those now living. Fossil remains are mostly those of mollusks, protozoa, radiates, and articulates. The rocks were made under water and consist of vast deposits of limestone, sandstone, and shales, which are either largely or entirely formed of the remains of shell-fish, clams, oysters, and other similar forms of life. This is known as the Silurian or Age of Invertebrates. The Devonian age followed, in which the first vertebrates appeared in the form of fishes. Plants became abundant and vast swarms of insects appeared. In the Carboniferous age the sur-

face was covered with vast numbers of plants that grew and formed beds of coal (q. v.) by the remains decaying under water. The period was characterized by alternated elevations and subsidences, thus forming in some regions two or more coal veins by being tilted, as in many regions of the Alleghany Mountains. In this period all the animals of the sub-kingdoms lived and reptiles began to appear.

In the Mesozoic time, known also as the Age of Reptiles, the plants and animals began to resemble existing species. The reptiles were greatly in preponderance, and included many species of snakes, turtles, crocodiles; the ichthyosaurus, an animal that swam in the sea or paddled in the mud, and the plesiosaurus, a large animal with a snake-like neck. Great birds also walked over the forming rocks and left their foot-imprints as fossil remains.

In the Cenozoic time North America was largely above the sea, though numerous large lakes with fresh water were abundant, the largest of which extended from Texas northeasterly to Nebraska. This period bears evidence that vegetation was still abundant in the Arctic zone, where fine forests of redwood, magnolia, and other species native to warm climates extended over vast regions. Large animals, including elephants, were abundant in the Rocky Mountains, of which fossil remains are not uncommon. The glacial period swept over the northeastern portion of the continent of North America at that time with its destructive effects upon life forms, causing vast drifts and carrying great boulders, reaching south to about the 40th parallel. The glacial period was followed by the Champlain period, in which alternating floods and varying climates followed in succession. Subsequently the climate was again tropical; many animals inhabited the forests, while slowly through long periods of time the temperature gradually fell. In the Quaternary Age the present animals and plants appeared and man was created. Geologists differ as to the length of the creation period measured in years, and many do not undertake to assign any given number of years. They commonly call all time before life appeared Azoic, the appearance of life Eozoic, and classify all subsequent time as exemplified above.

GEOMETRY (jĕ-ŏm'ĕ-trў), the science that relates to the measurement of definite portions of space, such as lines, angles, surfaces, and volumes. The various divisions of geometry include plane and solid geometry, analytical geometry, descriptive geometry, and higher geometry. Plane and solid geometry treat of right lines and plane surfaces, and of circles and spheres. In higher geometry are treated the conic sections, curved lines, and bodies generated from them. In analytical geometry are involved the various calculi in algebraical forms, while descriptive geometry embraces an extension of the principle of projections.

The origin of geometry is traced to the Hindus, but the Egyptians appear to have possessed a knowledge of it at the times the pyramids were built. Thales, who flourished in 639-548 B. C., is among the first of the Grecian geometrists, and to him is attributed the discovery of the properties of triangles. Pythagoras was a disciple of Thales, and largely perfected the geometry of polygons by discovering the theorem of the square of the hypotenuse. He also demonstrated that the area of a circle is greater than that of any plane figure having an equal perimeter, and that the sphere has the greatest volume of bodies bounded by an equal surface. Many other Greeks followed in adding to the science, among them Anaxagoras, Hippocrates, Plato, and Euclid. The latter founded a school of mathematics in Alexandria, Egypt, some time in the reign of Ptolemy Lagus, in 323-284 B. C., wrote a treatise on "Porisms," a book on "Data," and his "Elements of Geometry." Most of his works are lost, but his "Elements" are still in use in many schools and colleges. Among the names of celebrated mathematicians of recent times are Kepler, Descartes, Pascal, Newton, and Carnot.

GEORGE I., Christian William, king of Greece, second son of Christian IX., king of Denmark, born in Copenhagen, Dec. 24, 1845. He was liberally educated, and subsequently served with distinction in the Danish army. After the abdication of Otho I., king of Greece, in 1863, he was elected king by the Greek national assembly, and accepted with the consent of the treaty powers. In 1867 he married Princess Olga, daughter of Duke Constantine, at St. Petersburg. His administration has been popular, though marked with difficulties in the Balkan peninsula. In the war with Turkey, in 1897, he took an active interest for the betterment of conditions in Crete, and added to his popularity for constitutional government among his people. His son Constantine, duke of Sparta, born Aug. 2, 1868, is the crown prince, and during the Turkish war held an important command in the Grecian army.

GEORGE I., son of Ernest Augustus, king of Great Britain and elector of Hanover, born in Hanover, Germany, May 28, 1660; died June 10, 1727. In 1682 he married Josephine Dorothea of Zell, succeeded his father as elector of Hanover in 1698, and commanded in the imperial army in 1717 during the War of the Spanish Succession. Immediately after the death of Queen Anne, in 1714, he ascended the throne of Great Britain. His reign was marked by force of character, but Sir Robert Walpole was the chief influence in the government. The notable events include several risings of the Stuarts, alliances against Spain, and the organization and failure of the South Sea

Company in 1720. He was the first representative of the Hanover dynasty in England.

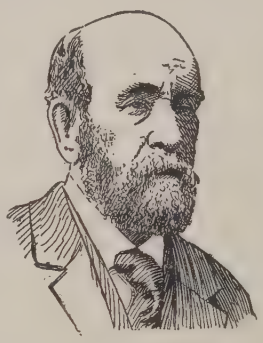
GEORGE II., son of George I., king of Great Britain, born Oct. 30, 1683; died Oct. 25, 1760. In 1705 he married Wilhelmina Caroline of Brandenburg-Anspach, and in 1727 succeeded his father. His interest in the government was more strongly exemplified than that manifested in his father's reign, though his policy was largely shaped by Walpole and Pitt. The reign was characterized by the rise of numerous eminent men of letters, in art, diplomacy, and war, and the War of the Austrian Succession, in which George II. took a personal interest. In this period Canada was conquered for England, the British Empire extended to India, and the colonial policy of Britain largely augmented.

GEORGE III., king of Great Britain, eldest son of Frederick, prince of Wales, born in London, June 4, 1738; died at Windsor Castle, Jan. 29, 1820. He succeeded his grandfather, George II., married Princess Charlotte Sophia of Mecklenburg-Strelitz, and was by her the father of fifteen children. His long reign of sixty years was noted for many historical events, among them being the Wilkes controversy, the American Revolution in 1775-83; the French Revolution in 1789, and the Irish Rebellion of 1798. It also witnessed the rise of many noted statesmen, among them Burke, Pitt, Chatham, and Fox, and such navigators as Nelson and Wellington. The mind of George III. failed in 1810, and the last several years of his life he was hopelessly insane.

GEORGE III.

GEORGE IV., king of England, son of George III., born Aug. 12, 1762, died Jan. 26, 1830. He was a man of fine intellectual ability and address, and possessed many personal attractions, but his reign was characterized by his failure in moral respects. In 1811 he became regent because of his father's insanity and in 1820 succeeded to the throne. Among the events of his reign was the Catholic emancipation act, passed in 1829 by the Wellington ministry. As he died without descendants, his only daughter having died childless in 1817, he was succeeded by his brother, duke of Clarence, with the title of William IV.

GEORGE, Henry, political economist, born in Philadelphia, Penn., Sept. 2, 1839; died Oct. 29, 1897. He was apprenticed when a boy to learn the arts of a seaman, but after reaching California engaged in journalism, and became one of the founders of the "Post" at San Francisco. In 1876 he was appointed state inspector of gas meters, three years later made trustee of the San Francisco free library, and about the same time published "Progress and Poverty," a work on economics that won wide popularity. In 1880 he settled in New York, visiting Europe the following year to study the land question, and made several subsequent visits to the British Isles and continental Europe. The united labor party of New York nominated him for mayor in 1886, but he failed in the election by a small margin. Shortly after he established the "Weekly Standard," which he edited till 1890, and also published numerous works on economical questions. Among his political tenets were absolute free trade; that the government revenue should be derived wholly by a tax on land values, and that the unearned increment of land value was created by and belonged to the state. He promulgated his theories by lecturing extensively and by organizing single-tax clubs in many sections of the country. Among his best known publications are "The Land Question;" "Social Problems;" "Protection or Free Trade;" and "The Irish Land Question."



HENRY GEORGE.

GEORGE, Lake, a beautiful lake in northeastern New York, extending from southwest to northeast. Its entire length is thirty-five miles, breadth from one to three miles, and greatest depth 400 feet. The surface has an elevation of 310 feet above sea-level. On its shores are Forts George and William Henry and numerous summer resorts, while its surface is dotted by 300 islands. The shores are beautified by lofty hills, on which picturesque forests abound. The outlet is into Lake Champlain.

GEORGE, Saint, a personage celebrated as the protecting saint of England, and venerated by both the Greek and Roman churches. His history is legendary, but it is thought that he was born at Cappadocia of noble Christian parents. He secured distinction as a soldier, professed his faith before Emperor Diocletian, and on April 23, 303, suffered martyrdom at Nicomedia. He was first honored as a Christian martyr in Phœnicia, but later also in Palestine and the whole of western Asia. Many churches were built to his honor, the Hellespont was named Saint George's Arm, and his fame spread rapidly to the west. In France he

was honored by the military profession in the 6th century, but the most widespread information of him came about after the Crusades, by which knowledge of various incidents connected with his life spread to all parts of Europe. In 1350 he was made the patron of the Order of the Garter by Edward III., and in the 15th century Frederick of Austria established an order of knighthood in his name. Several countries adopted banners to designate allegiance to the members of Saint George. They consisted of white with a red cross, and in some countries minute badges were worn on the arm of soldiers. Russia also regards him as patron saint.

GEORGE'S CHANNEL, St., an inlet of the Atlantic Ocean, which separates Wales from Ireland. It is one hundred miles long, has an average breadth of sixty miles, and is noted for its fisheries.

GEORGETOWN, the capital of British Guiana, situated near the mouth of the Demerara River, in Demerara county. It is the most important city of the Guianas. The streets are regularly platted, with fine shade trees and buildings, and the city is connected with adjoining trade centers by railways. Among the public buildings are the town hall, the government parliament, the Episcopal cathedral, Queen's College, numerous churches, a mariners' hospital, a public library, and a museum. Besides its public school system, there are a number of flourishing historical and scientific societies, and divers religious and economic associations. The streets contain several canals that facilitate local and export business, and furnish convenient connection with the harbor. Most of the buildings are placed on piers to elevate them above the low site. The principal exports include coffee, sugar, fruits, and rum. Among the imports are machinery, fabrics, and manufactured articles. The city is the center of the export and import commerce of the entire colony, has good lighthouses, an excellent harbor, and is fortified by strong defenses. Three-fourths of the inhabitants are Negroes and people of native birth. Population, 56,275.

GEORGETOWN UNIVERSITY, an educational institution located in the suburb of Georgetown, D. C., which is connected with Washington by street railways and is a port of entry. The university was founded in 1789, chartered by congress in 1815, and carries extensive and advanced courses of study. There are ninety-eight instructors, 750 students, a library of 90,000 volumes, and an alumni numbering about 3,800.

GEORGIA (jôr'jĭ-ą), a state of the United States, one of the original thirteen. Its northern boundary is formed by Tennessee and North Carolina, eastern by South Carolina and the Atlantic, southern by Florida, and western by Alabama. Its length from north to south is 320 miles; width, 253 miles; area, 59,475 square miles, or about the same size as the combined area of New York, New Hampshire, and Rhode Island. The rivers form a valuable network of drainage and furnish ample means of navigation. They are characterized by beautiful scenery, flowing through fertile valleys. The principal rivers include the Altamaha, Ocmulgee, Oconee, Ogeechee, Allapaha, Chattahoochee, the upper course of the Alabama, and the Savannah on the boundary between Georgia and South Carolina. A chain of islands trends along the coast, and is separated from the mainland by sounds or lagoons. The surface in the southern part is included largely in the Atlantic coast plain. Through the interior are fertile prairies, while in the northern part trends the Blue Ridge range, a division of the Appalachian Mountains. The highest peaks are Sitting Bull, elevation 5,050 feet, and Mona, 5,040 feet. This mountain region contains valuable mineral deposits and extensive forests. There are numerous rapids and waterfalls in the rivers coursing through the mountain districts. Among the principal minerals are granite, gold, slate, marble, limestone, bauxite, coal, iron, red and brown hematite, and carbonate. The seacoast has a length of 128 miles. Far toward the interior and over the islands extend beautiful forests of palmetto, oak, beech, magnolia, elm, and other useful varieties of timber. Swamp regions extend from the coast inland along the rivers and surround the lagoons; these are infested by alligators, wildcats, bears, and other animals common to moist and tropical districts. Much of the soil of Georgia is fertile, while its extensive and largely diversified natural resources are tending to render it one of the wealthiest and most prosperous manufacturing and commercial states of the Union.

Owing to the large expanse of Georgia from north to south and its difference of altitude, the climate is greatly diversified. In the regions slightly elevated above sea-level it is malarial and unhealthful, though the interior and northern portions contain a salubrious and bracing air, while the mortality statistics compare favorably with those of any of the states. The maximum temperature in the summer is 96°, and the minimum in the winter 10°, though sometimes the mercury falls to zero, and at rare intervals slightly below the zero point. Vegetation is considerably varied and includes many valuable plants. The principal productions are cotton, sweet potatoes, tobacco, corn, wheat, rye, oats, hay, and peanuts. Fruit culture is an important industry, the climate being favorable to the production of bananas, oranges, pears, peaches, lemons, grapes, cherries, apples, and many other varieties. Among the domestic animals horses, cattle, swine and sheep are the most important. The products in live-stock aggregate annually many millions of dollars. Within recent years the manufacturing in-

terests have been greatly enlarged and diversified, constituting the most important in the southern states, and bidding fair to rival in quantity and value those of the most productive states of the north. The forests yield vast quantities of turpentine and tar, and the lumber products are utilized for manufacturing machinery and furniture. The granite deposits near the boundary of Alabama are the most important and extensive in the world, and have led to the production of vast quantities of building and construction material and to its use in monuments. Distilled spirits and fermented beverages are also among the articles of manufacture, though the production of cotton and woolen fabrics is fast assuming vast importance, while tobacco in its various forms is a source of profit. As a producer of commercial fertilizer Georgia takes high rank, the products consisting principally of phosphate rock, which is reduced to acid phosphate, and a supply of nitrogen is secured for its preparation from cotton-seed meal. Railroads penetrate to all sections of the state and connect the growing interior cities with the coast and trade centers of the south and east. The total railroad lines aggregate 6,125 miles.

Educationally, Georgia has attained to an enviable position among the states of the south. Common schools are maintained throughout the state and are instrumental in causing illiteracy to rapidly decrease. Funds are supplied liberally to maintain high schools in the larger centers of population, while normal schools and other institutions of higher learning are rapidly multiplying and increasing in effective value. The number of higher institutions maintained for white pupils include several universities, about forty colleges and private institutes, while the needs of the Negro youth are met by six higher institutions; their appreciation of them is attested by a large attendance. The state university is situated at Athens. Other institutions have been established under state appropriation, among them the West Georgia Agricultural and Mechanical College, North Georgia Agricultural College of Technology, Middle Georgia and South Georgia Military and Agricultural colleges, Georgia Normal and Industrial College, State Normal School, and State Industrial College for Colored Youths. Besides these are numerous denominational and non-sectarian institutions of higher learning, among them Mercer University at Macon. There are upward of 7,750 churches in the state, which take numerical precedence in order: Baptists, Methodists, Presbyterians, and Catholics, but all Protestant denominations are represented. There are published about 425 periodicals, of which thirty-five are dailies, 310 weeklies, and fifty monthlies.

The history of Georgia begins in 1540, when De Soto visited that region with 600 Spaniards in search of gold. However, not until 1733 were permanent settlements made. At that time James Oglethorpe founded a colony for the refuge of poor debtors and the persecuted Protestants of Germany, and named the colony in honor of George II. The settlement founded developed into the city of Savannah, but in 1752 the charter granted Oglethorpe was surrendered to the British and Georgia became an English province. During the Revolution the people of Georgia entered into the struggle for liberty with much enthusiasm, but many were compelled to leave their homes by the invading armies of England. The first constitution was framed in 1777, and on Jan. 2, 1788, the constitution of the United States was ratified. In 1838 the Creek and Cherokee Indians were removed to Indian Territory, after prolonged troubles and local wars.

In the Civil War Georgia sided with the south, seceding in 1861, and furnished an effective force for the southern army. Its own capital, Atlanta, was for a brief time the capital of the Southern Confederacy. Sherman marched through the heart of the state when on his famous expedition to the sea. The recent history is one of large agricultural, manufacturing and mining development. Several industrial exhibitions have attracted attention to the superior resources of the state, such as the National Exposition held at Atlanta in 1881. Besides Atlanta, the capital of the state, there are numerous thriving cities, among them Athens, Augusta, Columbus, Brunswick, Macon, Rome, Savannah, and Thomasville. The state is divided into 137 counties, practically all of which are crossed by railroad lines. It is popularly called the Cracker State. The census of 1900 accords to the state a total population of 2,216,331. This number includes 1,035,222 colored persons, or 46.7 per cent. The total Negro population was 1,034,999.

GERANIUM (jĕ-rā′nĭ-ŭm), the name of a flowering plant, also called crane's bill, and which constitutes the typical genus of the order geraniaceæ. There are a number of varieties in the United States, the largest species being known as spotted crane's bill. It has a stem about two feet high and bears light purple flowers. Most species have a bitter root-stock, which is used in medicine, when it is known as alum-root. They thrive best in rocky places, on sandy shores, and on the slopes of mountains. By cultivation

GERANIUM.

a large number of varieties with beautiful flowering qualities have been originated. The geraniums commonly cultivated are grown as flowering plants, and are also known in botany as pelargoniums. These have been widely acclimated, include several species, and are popular for window culture and greenhouse decoration.

GERARD (zhă-rar'), **Baron Francois Pascal**, celebrated painter, born in Rome, Italy, March 11, 1770; died Jan. 11, 1837. He descended from French parents, studied under the celebrated painter, Louis David, at Paris, and attained early recognition as a portrait painter. Among his productions are excellent portraits of Napoleon, Talleyrand, the queen of Naples, Louis Philippe, and Talma. His most excellent work is a historical painting of the "Battle of Austerlitz." Louis XVIII. made him court-painter and promoted him to the rank of baron.

GERHARDT (zhă-rar'), **Carl Friederic**, celebrated chemist, born in Strasburg, Germany, Aug. 21, 1816; died Aug. 19, 1856. After securing a liberal education at Carlsruhe and other schools, he settled in Leipsic, where he became greatly interested in chemical experiments. His additions to the sciences include several new ideas and classifications. He developed the doctrine of homologous series, originated the theory of types; and devised an improved system of notation in chemistry. His chief work is entitled "Traite de Chimie Organique."

GERHARDT (gĕr'hart), **Paul**, famous poet and theologian, born in Saxony, Germany, March 12, 1607; died June 7, 1676. In 1668 he was appointed archdeacon of Lübben in the duchy of Saxe-Merseburg. He ranks as an eminent Lutheran divine and is the author of many songs still popular in Protestant churches. His productions include 123 excellent hymns, many of which have been translated into various language. The most celebrated and widely translated is "Now All the Woods Are Sleeping." His collected songs were published in 1666 under the title "Spiritual Songs."

GERMAN SILVER, an alloy of nickel, copper, and zinc in varied proportions. It is whiter and harder than silver and takes a high polish. Strong acids attack it, and some organic acids, such as vinegar, also affect it materially. It is used largely in the manufacture of forks and spoons, knife and fork handles, candlesticks, and watch cases.

GERMAN SOUTHWEST AFRICA, a colonial possession of Germany, bounded by Portuguese West Africa on the north, British South Africa on the east, and by Cape Colony and the Atlantic Ocean on the south and west. The area includes 322,450 square miles; population, 350,500. Among the chief rivers either wholly or partly in the region are the Orange, Cubanga, Cunene, and Zambezi. Walfisch Bay receives the water of the rivers draining the interior. It contains the most important harbor, besides which are Swakopmund, Luderitz Bay, and Sandwich Harbor. Windhock, situated on the Walfisch River, is the seat of local government and is connected by railway with the harbor of Swakopmund. The coast region is sterile, but the interior is susceptible to cultivation, and yields agricultural products, cattle, horses, hides, and ostrich feathers. There are extensive deposits of copper and other minerals. Since the war between the Boers and British a considerable number of Boer agriculturists settled in the fertile regions of the interior and are aiding in rapidly developing its productive resources, and the use of its forests in manufacturing.

GERMANTOWN, a town included with Philadelphia, Penn., in 1854, and the seat of an important battle between the American army under Washington and the British under Howe, on Oct. 4, 1777. Howe occupied Philadelphia and sent a detachment to seize Forts Mercer and Mifflin, which caused Washington to make an attack at Germantown, where he hoped to crush the British. Early in the morning two columns of the American army advanced upon the village under Sullivan and Greene, but the Americans were thrown into a state of confusion on account of a heavy fog which occasioned a mistake and led Greene to charge upon the left center of the American army, causing a panic and the loss of the battle. Washington conducted a retreat in good order before the advance of Cornwallis, who had hurried from Philadelphia with two battalions. The American loss was 1,000 men, and the British 600.

GERMAN UNIVERSITIES, the term applied to the more important institutions of learning founded in the German-speaking countries, but located principally in Germany. These institutions are the most efficient and constitute the greatest organizations of institutional learning in the world. Twenty different institutions make up the number, of which fifteen are Protestant, three Roman Catholic, and two regarded as non-sectarian. This entire system includes 2,820 instructors and professors, about 35,500 students, and numbers among the alumni some of the leading thinkers and writers, both living and dead. The institutions maintained in Berlin, Leipsic, Dresden, and Vienna are the largest. However, the University of Heidelberg is the oldest, having been founded in 1386. All the courses of study articulate with those of preparatory schools, though foreigners are admitted to membership without examination on certificates from foreign institutions of recognized merit.

The discipline is rigid, and expulsion from one university constitutes a bar to admission to the others. In the courses are included medicine, philosophy, theology, and law, though in some the natural sciences, civics, higher pedagogy, music, and political economy are added. The studies are largely

elective, which gives students the privilege of pursuing such advanced work as seems best adapted to their needs, while they may also enroll in different institutions for the purpose of taking additional and supplementary work. These universities are under the control of appointees of the government, who constitute, with the minister of public instruction, the managing, directing, and guiding officers for particular institutions. The expense of maintenance is borne largely by the state, only about ten per cent. being paid by students in the form of fees. Among the university museums, libraries, and publications those of Germany take high rank. In all the great centers of learning are adequate requirements to facilitate references and home reading, while the scientific societies embrace also a wide range of organizations. Instruction is mostly by lectures, the preparatory work being done largely in laboratories and during private hours. Students may secure lodging and board in private families, but ample facilities are provided at the dormitories and may be utilized at small expense. Most of the courses cover four years of work, though in medicine it is often five. The class of degrees issued depends largely upon previous preparation.

GERMANY (jĕr'mạ-nĭ), one of the great powers, known more especially as the German Empire, situated in the north central part of Europe. Its northern boundary is formed by Denmark and the North and Baltic seas; eastern and southern by Russia, Austria, and Switzerland; and western by France, Belgium, and Holland. The total area of Germany, exclusive of the colonial possessions, is 212,028 square miles, about one-sixteenth of that of all Europe, and the population is 56,570,500. There are twenty-eight cities that have a population of over 100,000; the largest of these are Berlin, Hamburg, Munich, Leipsic, Breslau, Dresden, Cologne, Frankfort-on-Main, Magdeburg, and Hanover. The coast line is indented by numerous inlets, giving it a total coast frontage of 1,150 miles. There are three great drainage basins—those of the Danube, of the North Sea, and of the Baltic Sea, which are penetrated more or less by numerous tributaries, and the valleys are characterized by exceedingly fertile soil. The greater portion is drained toward the north into the North and Baltic seas by the Vistula, Oder, Elbe, Weser, Ems, and Rhine, each of which has numerous tributaries. Its southern part, especially Bavaria, is drained by the upper Danube and its numerous affluents into the Black Sea. The rivers are largely connected by canals and furnish a vast network of means to navigate the interior, while many jetties have been constructed in the rivers to deepen and improve them.

Among the principal canals are the Finow, forty miles long, in Brandenburg; the Ludwig's, 110 miles, in Bavaria—this unites the Black Sea and the North Sea by connecting the Danube and Main; and the Kiel and Eider Canal, twenty-one miles, which unites the North and Baltic seas. The Great Canal extends from Kiel to the Elbe, facilitating the movement of the largest vessels, and is now the principal navigation route for commerce between the North and Baltic seas. In the interior is a sandy plain which extends to the North Sea, and is diversified by elevations attaining an average height of about 575 feet. Numerous small lakes abound, among them Spirding Lake, Great Haff, Die Muritz, and Lake Constance on the boundary of Switzerland. The mineral and thermal springs are exceedingly valuable, and have been known from the early history of Europe. No great elevations exist, the highest being the Bavarian Alps, of which Zugspitz, in Bavaria, is the culminating peak and has an elevation of 9,675 feet. Other elevations are the Vosges, 4,710 feet, and Felberg in the Black Forest, 4,910 feet. The mountains and tablelands are largely in the southern part, prevailing in the ranges of the Vosges, Böhmer Wald, Erzgebirge and Riesengebirge, and the Hartz Mountains in the interior.

The geological formations of Germany are diversified, the principal characteristics being the recent sand loam deposits of the northern portion; Jurassic rocks in the central, and Palæozoic rocks in the southern. The minerals include coal, limestone, iron, clays of all varieties, cobalt, saltpeter, ocher, and petroleum. Its iron deposits and smelting works are the most important in Europe, these being most common in Alsace, Lorraine, Saxony, and Silesia. The climate is favorable in all parts of the empire; the average annual rainfall is about twenty inches, and the soil generally productive. About one-fifth of the entire area is covered by forests that yield valuable timber products, the most extensive area being in central Germany and includes principally oak, elm, pine, fir, and beech. More than seventy per cent. of the entire area is under cultivation, either for agricultural or horticultural purposes. The principal fruit products include vines, though an abundance of peaches, pears, apples, quinces, and many varieties of smaller fruits are produced. Among the chief agricultural products are rye, wheat, barley, oats, tobacco, hops, flax, beet-root, and vegetables. The consumption of cereals is far above the production, hence imports of this class are large. In many of the forests abound varieties of small game, while in some localities wild boars and wolves are not infrequent. In the Bavarian Alps are found the wild goat, wild deer, chamois, marten, and fox. The region of plains in the north is frequented by aquatic birds, such as ducks, snipes, and geese, which migrate there from the north seas. Storks are also abundant and are frequently found

in the high buildings of large cities. These birds, like other game, are protected by government regulations. The coast and stream fisheries are very valuable and produce merchantable quantities of clams, oysters, eels, salmon, trout, herring, carp, and tunny.

Germany is noted for its vast manufacturing interests, about sixty-eight per cent. of the people being engaged in that industry and in commercial enterprises. Its production of beet sugar is superior to that of any European country, while in the steel and iron manufactures it is among the leading nations of the world. Other manufactures that take high rank are those of machinery, coke, seed-oil, linen, silk and woolen fabrics, wine, glass, earthenware, sailing vessels, furniture, toys, musical instruments, and chemicals. A vast capital has been concentrated in these manufactures and flourishing centers of population have resulted. Many German syndicates have entered upon the development of trade in the colonies and in foreign countries, particularly in Russia, the United States, Brazil, and China. German capital invested in railroads in the United States alone is $185,000,000, while other interests have likewise attracted much attention. The merchants' marine of Germany holds third place, being exceeded only by those of the United States and England, but closely approximated by France. Its leading seaports are Kiel, Hamburg, Stettin, Bremenhaven, Lübeck, Dantzic, and Konigsberg. The total number of its steamships is 900, sailing vessels about 3,500, and these, in connection with many railway lines, canals, and navigable streams constitute an ample aggregation of facilities to carry on its vast interior and foreign commerce. Railroad building began in Germany in 1835. At present the system aggregates 34,500 miles; the length of telegraph lines is 90,275 miles, and telephone lines approximate about an equal length. The postal system is under direct federal control, while telephones, telegraphs, and railroads are largely under control and ownership of the national or state governments. The nation maintains a gold standard monetary system of which the mark, valued at $0.238 in United States, is the unit. Among the nations of the world it has a high financial standing, and its national debt is classed with the smallest.

The people of Germany are classed as Low German and High German. This classification includes respectively the people of North and South Germany, the term being applied on account of the difference of elevation in the different sections. Emigration from Germany has exceeded that of any other country, except Ireland. The number of Germans in the United States is about 8,000,000, exclusive of the American descendants who have lost the identity of language. The total number of German people residing in other countries is about 50,000,000, of which the greater number reside in the United States, Austria, Switzerland, Belgium, Russia, and Australia, and they are otherwise distributed to various sections of the world and in colonies. About sixty-five per cent. of the population of the empire are Protestants, and thirty-five per cent. Roman Catholics; the latter being resident most largely in Alsace, Lorraine, Bavaria, and Baden. Since 1884 Germany has stimulated a wider colonial policy and acquired foreign possessions that include an area of 1,250,000 square miles, and a population of 16,500,000. The most important of its colonies are in Africa, and include German Southwest Africa, German East Africa, Togoland, and Cameroon. Besides, there are numerous island possessions, which embrace the Bismarck Archipelago, Kaiser Wilhelmsland, Marshal Islands, Solomon Islands, Caroline Islands, and Kiao-Chau, in China. The emigration from the empire was greatest in 1881, when 220,790 left German ports. Since it has greatly decreased, owing largely to the prosperous development of manufacturing enterprises and the general rise in wages. At present the annual imports aggregate in value $1,692,575,500, while the exports are equal to about $1,350,585,250.

The educational affairs of Germany are in a prosperous and effective condition, its schools, colleges, and universities taking the highest rank among the nations of Europe. For many years it was the land of pedagogy, in which teachers flourished who gave impulse and enthusiasm to its educational arts, promulgated basic principles vital in the education of man, and paved the way for progress in other lands. Elementary schools are supported in all communities, while institutions disseminating knowledge of industry, arts, sciences, and higher education are established and maintained under state and national supervision. The elementary schools include 61,500, in which 125,500 teachers give instruction, and 8,980,000 pupils attend. There are twenty universities that take high rank, numerous scientific schools, academies, and gymnasiums. The universities carry courses in medicine, law, theology, and philosophy; many are supplemented by facilities to teach natural sciences and economy, and all are supplied with excellent museums, general libraries, and numerous art collections. The scholars of Germany are renowned for faithful research, patience and thoroughness, and have given the world many authorities on the important sciences and for professional reference. Newspapers, magazines, and periodicals have a wide circulation and are made up of superior educational, scientific, and intellectual material. Attendance at school is compulsory. Normal schools are provided in which teachers secure professional training before entering upon their duties.

The government is a constitutional monarchy, in which the kaiser is the highest

officer. The office is hereditary in the family, and in it is vested the power to represent the empire in concluding treaties and alliances, declaring war, and concluding peace, and the emperor has chief command of the army and navy. Internal trade is free, while a high protective tariff is in force in relation to other countries, which, with the revenues from railroads, telegraphs, the postal system, and excises, constitutes the chief source of government receipts. The legislative power is vested in the bundesrath and the reichstag. In the former are fifty-eight members, appointed by the several states, and the latter has 397 members, elected by a universal ballot. The term of office in each branch is five years. The chancellor is appointed by the emperor and is the president of the bundesrath. The proceedings of the legislative branch are public. A bill, to become a law, must have a majority vote in both branches, be assented to by the emperor, and receive the signature of the chancellor.

The political parties are organized similarly to those of the United States and include the liberal, conservative, and clerical. The liberal party advocates a united Germany on constitutional lines; the conservatives constitute the imperial party proper; and the clerical, also known as the ultramontane, is the Roman Catholic party. These, besides the social democratic and several others, comprise the leading factors and are maintained by aggressive organization work. There are twenty-six states in the empire, pledged to an eternal union, none of which have the power to secede or withdraw from the confederation. The laws of the empire are fundamental, and all others must harmonize and conform to them. Every male citizen of sound health and constitution is required to serve three years in the imperial army, in the reserve four years, and in the militia or landwehr five years. No one may be represented by a substitute, but the three years' compulsory service may be reduced one year by the completion of a course in the gymnasia. The navy has been enlarged within recent years, especially since the war with China in 1900, and now comprises one of the most powerful in the world. There are thirty battleships, forty-five cruisers, 125 torpedo boats, eighteen dispatch vessels, and numerous others. The entire peace footing is 510,350 men and 23,500 officers; the war footing, 3,450,000 men. As a whole the army and navy are well organized and thoroughly disciplined and constitute an effective and mobile force.

The German people are descendants of the Indo-Germanic or Aryan race. In history they are first mentioned in the year 113 B. C., when they came in contact with the Romans. At that time they occupied a region east of the Rhine and north of the Danube, and were divided into numerous separate and independent tribes, being bound together by language and racial ties. In the time of Alexander the Great the Germanic tribes of the Baltic coast were met with, but the first authentic history of them appeared in the "Commentaries" of Julius Cæsar in 58 B. C. The Celtic name given to these tribes was Germani and was the name used by the Romans, but the term by which they designated themselves was the present name, Deutsch, meaning people. There were about fifty tribes, most of which were united in the 1st century and succeeded in overthrowing Roman control, driving the legions of Varus from their possessions; while in the year 200 A. D. the Germanic peoples invaded Roman territory and threatened their capital. Later the different tribes formed numerous groups, the most powerful being known as the Frisians, Burgundians, Saxons, Goths, and Franks. Soon after the Huns caused them to cross into the Roman Empire, and for many years they controlled at least a portion of the former Roman possessions.

The Franks under Clovis defeated the Roman governor in 486, and established their seat of government near the present site of Paris. After subduing the Alemanni, Visigoths, and other minor tribes, Clovis became the ruler of Gaul, and, after his death, in 511, these possessions were divided among his four sons. The dynasty of Clovis was known as the Merovingian and controlled the destiny of the German tribes until the rise of Charlemagne, who became emperor in 800, founded the Carlovingian dynasty, and gave rise to a long line of kings and emperors who for more than 1,100 years occupied the throne of Germany. The empire of Charlemagne was reared on the ruins of Rome, effecting marked changes in the civilization and intellectual status of the Germans, and impressed them with a nationalism sufficient to endure, though suppressed at intervals. The vast empire was divided among the successors of Charlemagne and sub-divided successively until many small principalities with potentates having absolute power came into existence. In 887 the French and Germans became finally separated, at which time there existed five powerful divisions among the Germans. These constituted the Bavarians, Saxons, Lorrainers, Swabians, and Franks, of whom the last were the most powerful, and in 911 succeeded the descendants of Charlemagne in the government of Germany. Duke Henry of Saxony is counted the founder of the German Empire, since he was the first to establish a government distinctly German, and largely strengthened the five dukedoms by greatly reforming the military system, building fortresses, and providing for internal improvements. The Saxons reigned about one hundred years, during which the Wends rose in rebellion in 928, the Magyars in 933, and other local differences occurred. However, the Saxons maintained their sov-

creignty and were followed by the house of Franconia, which ruled until 1125.

Conrad II. was the first Franconian king. He ruled energetically in 1024-39 and succeeded in subduing the nobles and establishing an alliance with Canute, the celebrated Danish king. In 1138 the Hohenstaufen dynasty began its reign with Conrad III., and ranked as one of the most celebrated of mediæval German history. The reign of this dynasty was marked by prolonged conflicts between the imperial powers and that of the pope, and also by the organization of the early Crusades; Frederick, surnamed Barbarossa, being the most celebrated of this line. The first Crusade was undertaken in 1095; and in the second, organized in 1147, Conrad III. took a conspicuous part. He amalgamated the strength of his nation into a vast army, but both he and his soldiers perished in an attempt to reclaim the Holy City, his death occurring in the third Crusade, after a reign of thirty-eight years. The Hohenstaufens governed until 1273, when the Carlovingian line became extinct, and the next king was chosen by the nobles, who, after long contests, decided upon Rudolph I., founder of the Hapsburg dynasty, which is still the ruling line in Austria. Within the period of his reign the royal authority was largely extended, important conquests were made in southeastern Germany, and the influence of the princes was curtailed largely. In the reign of Albert of Austria, in 1298-1308, began the prolonged revolutionary movements for the independence of the Swiss cantons. Within the succeeding century occurred sanguinary contentions among rival claimants of the throne, and in 1415, in the reign of Sigmund, terminated the persecutions of the followers of John Huss, who was burned at the stake on a charge of heresy, but this event was only a forerunner of the Reformation. Luther began to preach the Protestant faith under Maximilian I., and the reign of Charles V., from 1519 to 1556, fully grounded that faith in Germany. The seeds of civil discord germinated during the great religious movements resulted in the Thirty Years' War, which began its depressing ravages in 1618.

The weakened condition of commerce, the stagnation of interior trade, and the heavy burdens of taxation occasioned by the prolonged war brought a desire for the cessation of hostilities, which was first secured by the peace of Augsburg. However, the terms of the treaty gave offense to various adherents of Luther, Calvin, and the Catholics, and war soon broke out anew. In the meantime Wallenstein led the army against Bohemia for the extermination of the Protestants, and these movements continued until the Swedes, under Gustavus Adolphus, came to the rescue of the Protestants, when the latter obtained his memorable victory at Lutzen in 1634. The ascension of Ferdinand III. to the throne, in 1637, led to the treaty of Westphalia in 1648, which adjusted religious matters, though Germany was divided into 203 independent states, and each gave only nominal support to the emperor. Besides, Switzerland and the Netherlands were separated from the empire, while Alsace was ceded to France. After the treaty of Westphalia, Prussia gained strength and became the controlling power in Germany and the stronghold of Protestantism. This led to the rise of the house of Hohenzollern, as the house of Hapsburg was Catholic, giving Prussia marked advantage over Austria. In 1702-13 the War of the Spanish Succession brought marked glory to the rising power of Germany, but it did not operate to solidify and strengthen the internal affairs of the empire. Soon after, in 1756-63, occurred the Seven Years' War, which gave Prussia additional advantages over Austria. Frederick the Great of Prussia strengthened the power of the army, replenished the treasury, and made that country the center of German unity.

The power of Germany was almost destroyed by the wars immediately following the French Revolution, and in 1806 Francis II. resigned the title of emperor of Germany, having assumed that of emperor of Austria, with which the so-called Holy Roman Empire ended. In 1813 the allied forces of Prussia, Russia, Sweden, and England frustrated the plans of Napoleon to add most of the German states to France, at the battle of Leipsic, and the vigorous assault of Blücher with 30,000 Prussians destroyed his last hope at Waterloo in 1815. The congress of Vienna now endeavored to restore order, and organized a German Confederation, of which the emperor of Austria was chosen president, Frederick William III., as ruler of Prussia, receiving one-third of Saxony. In 1848 the national assembly, which met in Berlin for the purpose of framing a national constitution, was prevented from rendering material aid by the rivalry of Austria and Prussia, and was followed by a Revolution, but Frederick William IV. promised a constitution. The growing popularity of Bismarck and his firm rule led to a final union.

In 1866 occurred the war between Austria and Prussia, known as the Seven Weeks' War, which was the last great struggle for German unity, and, under the leadership of von Moltke, the Austrians were utterly routed at Sadowa, in Bohemia, on July 3. The Prussians occupied Vienna on August 23, and the war terminated after seven weeks. In the peace treaty which followed Austria was shut out from the federation formed north of the Main River. France, jealous of the rising power of the house of Hohenzollern, found occasion to declare war when Leopold, a member of the family, was offered the crown of Spain. War was declared on July 19, 1870, and the South Ger-

man states were enthusiastic from the first in supporting Prussia, while the northern states showed an equal degree of interest in the cause of unity. Two powerful armies invaded France, and by a spirit of marked enthusiasm won battle after battle, captured Napoleon III. with an army of 90,000 men, and sent him to Germany as a prisoner. A siege of Paris caused that city to surrender on Jan. 29, 1871. The treaty which followed required France to pay $1,000,000,000 as a war indemnity and cede Alsace and the German portion of Lorraine to Germany. The most important result of the war with France was the solidification of the German states, the development of a spirit of nationalism, and the restoration of the old empire. King William was proclaimed emperor with the title of William I. on Jan. 18, 1871, before leaving the capital of France, and was received on his return by his own people with signal demonstrations.

Among the subsequent events of the empire are its constant growth of influence, colonial expansion, the building of great railroads and canals, and vast improvements in economic and social life. The triple alliance formed by Germany, Austria, and Italy on March 9, 1888, strengthened the peace aspect of Europe and was renewed by Caprivi, the chancellor who succeeded Bismarck. William I. was succeeded by Frederick, his son, on March 9, 1888, but the new emperor suffered from a cancerous affection in the throat and died June 15, and was succeeded by his son William II. The latter at once adopted the policy of William I. and Bismarck in extending the colonial empire, enlarged the army and navy, and vigorously supervised the internal conditions of his dominion. He visited many of the leading courts of Europe in 1889, two years later he appointed Chancellor Caprivi to succeed Bismarck, and in 1894 selected Prince von Hohenlohe for that important position. In 1898 he visited Palestine, where he took a prominent part in consecrating an Evangelical church, the Church of the Redeemer, at Jerusalem. The empire became involved in a controversy with China in 1900 owing to the murder of the German minister at Pekin Clemens A. von Ketteler (1853-1900), and sent an army and warships for the purpose of securing to the empire an adjustment of important issues between the two nations. Other complications followed and led to an alliance of European powers and the United States, the allied army being commanded by Count Waldersee. The contentions resulted in an extension of foreign interests in China, Germany securing its share of the benefits, in addition to a payment for individual damages sustained.

The German language is a branch of the Indo-European group of languages. It is commonly divided into three parts, known as Old High German, Middle High German, and New High German. In this classification the word "high" has a mere geographical distinction, and is used to distinguish from the German spoken in the low countries. As to time the periods are classified to include the years 600-1100, from the rise of the Franks to the Crusades; 1100-1500, from the Crusades to the Reformation, and from 1500 to the present. While the different provinces still have a somewhat variant dialect, the official language and that taught in the schools is universal, and there is a constant tendency to unify the spoken tongue in all parts of the region where the German language is officially recognized. The language is especially rich in synonyms, making it prolific in words to express emotion, and adapting it to the purposes of the orator and poet. There is little difference between the German alphabet and that of the English, but the orthography and pronunciation differ considerably. While the grammar is more complicated by the fuller inflection and conjugation of words, it is notable that the orthography is much more in line with natural sounds, and as a result spelling and pronunciation are less difficult.

The year 600 A. D. is fixed as the time when Gothic influence began to decline, and the Franks took the lead in German history. After gaining control of Middle and South Germany, they embraced Christianity. Collections of folklore and legends were made as early as the time of Charlemagne. That distinguished sovereign not only encouraged literary art, but also made a collection of popular German poetry, mostly songs. The age of the Minnesingers, or singers of love, began about 1200, when companies of poets visited the castles and courts of nobles, where they sang the story of King Arthur and the history of Troy. To this period belong the "Nibelungenlied" and "Gudrun," in which the story of the heroic combats of Siegfried is related, and in them is a detailed account of how Griemhild, the beautiful daughter of King Gunther, was won by the gallant Siegfried. They also relate the story of sinking the Nibelungen treasure in the Rhine; detail the death of Attila the Hun, and give a glowing account of the death of Hagen at the hands of Griemhild. Another epoch is marked by the introduction of the mysteries and passion plays. These plays attained to the height of popularity in the 15th century, and not only gave rise to the German drama, but still continue in such interesting exhibits as are periodically witnessed at Oberammergau. Though all these and Walther von der Vogelweide, the greatest of the Minnesingers, had an extended influence upon the language and literature, it remained for Martin Luther to institute the era known as that of the New High German. This he did by translating the Bible into the German, thereby giving the language a fixed literary value, and he also wrote many songs that

still engage the attention of singers in many tongues. Hans Sachs (born in 1494) was a contemporary of Luther, and his permanent place in literature is due to the 6,048 poems from his pen. Johann Fischart (1540-90) is the author of numerous works, including "Christian Education," "Luckship," and "Marriage-Book," the latter depicting the joy and peace of home life. To this epoch also belong the popular stories known as "The Wandering Jew" and "Eulenspiegel." The 17th century witnessed a period of great revival in learning and culture, and in it were translated many of the classics, while biography, romance, history, and philosophical works received marked attention. Martin Opitz (1597-1639) is the author of "German Poetry," a work celebrated on account of its purity in language and dictation. Other writers of this period include Paul Gerhardt (1607-76), one of the greatest hymn-writers.

German literature in the 18th century became quite free from foreign influence, and also exercised a marked impression in Switzerland and the low countries. Johann Gottsched (1700-66) was the most eminent literary man of the early part of the 18th century, and may be regarded the most eminent philologist prior to Grimm. His chief writings include the drama, "Dying Cato," while Johann Jakob Bodmer (1698-1783) translated "Paradise Lost" and published the "Nibelungenlied." Friederick Gottlieb Klopstock (1724-1803) is one of the noted poets of this period, and the author of a religious epic entitled "Messias," while Christoph Wieland (1733-1813) takes high rank with the cultured poets. His best known productions include "Oedron," a tale of fairy-lore, and he also made numerous translations from Shakespeare. However, the most eminent poet of this period was Gotthold Lessing, who not only published comedies and tragedies of much value, but greatly benefited literature by elevating style through efficient criticism. His writings include "Nathan the Wise," "Hamburg Dramaturgy," and "Young Scholar." J. G. Herder (1744-1803), a contemporary of Lessing, is noted chiefly for his eminent criticisms. Among the eminent writers of the latter part of the 18th century are J. W. von Goethe and J. C. F. Schiller, two of the most distinguished characters in German literature. The names of these two writers are inseparably linked, and their productions rank with the most eminent in the world's literature. See Articles.

The excellent system of public schools and universities of Germany placed its literature on a high plane, a result to be expected from the fact that its scholars are recognized the foremost in the world. Among the philosophical writers are such eminent men as Schelling, Scheele, Kant, Fichte, Hegel, Lotze, Schopenhauer, and von Hartmann, whose productions are still studied by the eminent thinkers in many lands. Among the historians are Niebuhr, Ranke, and Momsen; among the Biblical writers, Strauss, Schleiermacher, Paulus, Neander, De Wette, and Baur, while Humboldt, Agassiz, and Max-Müller, who also wrote in English, hold eminent places as naturalists and scientific inquirers. Heinrich Heine, Ludwig Uhland, August Schlegel, Ferdinand Freiligrath, and H. Fallersleben are classed with the later poets, while Karl Gutzkon (1811-78) and Gustav Freytag (1816-95) are among the novelists, and George Ebers takes rank as an Egyptologist and general writer, producing among others "Cleopatra;" "In the Blue Pike," and "Barbara Blomberg." The satirists include Jean Paul Richter; the humorists, Fritz Reuter; the dramatists, C. F. Hebbel, and the miscellaneous writers, Gottfried Keller, Paul Heyse, and Wilhelm Jordan. The Grimm brothers are noted for their eminent services to philology.

German literature includes the best known authoritative works on music, and the master musicians have so fully touched the hearts of the people that their names are known in all civilized lands. These include such eminent composers as Mozart, Bach, Beethoven, Haydn, and Handel in the 18th century, and Meyerbeer, Mendelssohn, Weber, Wagner, Schumann, Schubert, Liszt, and Franz Abt (1819-85) in the 19th century. Among the eminent educational writers are Fröebel, author of "Education of Man;" Henry Pestalozzi, writer of "How Gertrude Educates Her Children," and Kant and J. F. Herbart, two well known philosophers and writers of works on psychology. Among the eminent writers of the 20th century are Hermann Sudermann (born in 1857), who takes high rank as a novelist and dramatist, among his productions being "Dame Care;" "Sodom's End;" "Love in a Grove," and "Honor." Gerhart Hauptmann (born in 1862) is also famous as a dramatist, his works including "Weavers" and "Sunken Bell." Other writers of this period include the historians, Ludwig Hartmann, Hans Prutz, Paul Hassel, and Johann Penzler; the literary critics, P. Schwanke, Karl Federn, B. D. Diederich, and M. Neckar, while the writers of fiction embrace Max Dreyer, Wilhelm Polenz, Hermann Stehr, and William Armenius.

GERM THEORY OF DISEASE, a view according to which a specific germ exists for each definite disease infectious to the various organs. The theory implies that these germs or living organisms are communicated from an infected person, principally by food, drink, or air; grow and multiply in the body they come in contact with, and produce the disease of which they are characteristic. The particles of contagious matter retain their vitality during definite periods; this, like their growth and promulgation, varies in the different forms. It has

been successfully demonstrated that they succumb when subjected to a temperature of 200° to 300° Fahr., and to a low temperature of from 30° to 75° below zero, though in each case the infectious matter must be exposed for a definite time. In the 17th century Hauptman expressed the view that invisible germs existing in the air may cause epidemic diseases, and all the more important discoveries in relation to contagion have been made since that time. The living germs are grouped as micro-organisms, and vary greatly in size an form. They multiply largely by fission, especially the bacterium and micrococcus; the former being rod-shaped and about the ten-thousandth of an inch in length; and the latter round in form and about the thirty-thousandth of an inch. Other forms are the vibrio, spirillum, and bacillus, the latter being formed like rods, slightly larger than the bacterium, and multiply by spores and divisions. Animals having died from splenic fever contain blood laden with swarms of bacilli, which multiply and throw off spores that can be cultivated, and the production may be continued through different classes of fluids. A rabbit or guinea pig can be inoculated with artificially developed contagion, and death ensues from the same disease as the animal from which the contagion-germ was taken. For many centuries tubercles were known to be hereditary, and regarded non-infectious, but the tubercular bacilli have been discovered.

Dr. Koch, of Berlin, cultivated the bacillus organism, and communicated it to animals, in whose bodies it was found after death. In 1876 he published an important treatise on the life history of this form of germ-life, and in 1882 announced his discovery of a micro-organism in tubercles which he regarded the principal, if not the only cause of consumption of the lungs. Later he demonstrated that the expectorations of consumptive patients contain microbes which multiply by spores and infect other persons with the disease, even after having dried, in which form they are scattered in the air and breathed in the regular course of respiration. He also, in 1883, discovered peculiar bacilli in cholera patients; these being formed like a comma, and are found in large numbers in the intestines of persons who succumb to the cholera epidemic. The germ theory of disease was investigated by Pasteur, who also supported it, and contributed much valuable information regarding various forms of bacilli. A general knowledge of the conditions of life of the various kinds of organisms has greatly decreased the spread and harmful effect of contagion, while pending investigations promise valuable and specific discoveries of more particular and complicated forms.

GEROME (zhă-rōm), **Jean Leon**, historical painter, born in Vesoul, France, May 11, 1824. He studied at Paris under Paul Delaroche, traveled extensively in Italy and the East, and in 1863 was made professor of painting in the Paris School of Fine Arts. The picture entitled "Age of Augustus" was purchased by the French government in 1855, and made him a high reputation. This and many others of his productions have been reproduced largely as photographic copies and excel in beauty of coloring and delicacy of touch. His other well known paintings include "Slave Market in Rome;" "Promenade of the Harem;" "Roman Gladiator in the Amphitheater;" "Bacchus and Cupid," and "Cleopatra and Cæsar." He made many fine productions in sculpture, of which the best known is "Pygmalion and Galatea." He died Jan. 10, 1904.

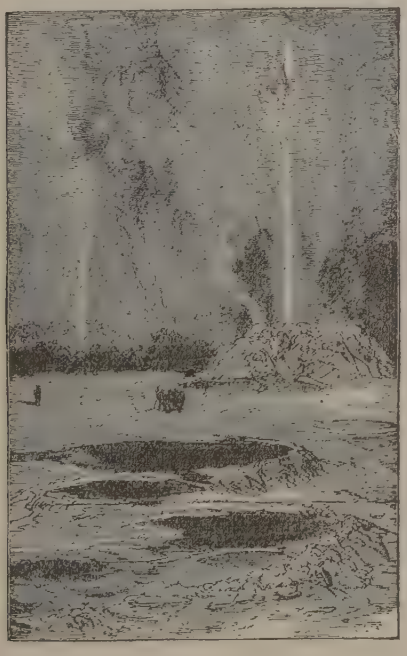
GERRY (gĕr'ĭ), **Elbridge**, statesman, born in Marblehead, Mass., Jan. 17, 1744; died in Washington, D. C., Nov. 23, 1814. He engaged in commercial enterprises at an early age, accumulated a considerable fortune by close devotion to business, and became a member of the general court of Massachusetts Bay in 1773. In 1776 he was a member of the continental congress, where he signed the Declaration of Independence, but, owing to his views against a strong central government, opposed the constitution. He was chosen a member of congress in 1780, and re-elected in 1783 and 1785. The anti-federalists elected him a member of the first national congress in 1789, re-elected him in 1791, and in 1797 he was commissioner with Marshall and Pinckney to form a commercial treaty with France. In 1811-12 he served as governor of Massachusetts, during which term he removed members of the opposing party from office and appointed democrats in their place. He also advocated redistricting the state into congressional districts in a manner intended to benefit his own party in the selection of congressmen, from which the name "gerrymandering" became applied to the establishment of legislative districts for partisan advantage. In 1812 he was elected vice-president of the United States, but died before the expiration of the term.

GETHSEMANE (gĕth-sĕm'a-nee), a place about three-quarters of a mile southwest of Jerusalem, at the foot of Mount Olivet, and contiguous to the garden noted as a favorite resort of Christ and his disciples. In this garden Christ retired the night before the crucifixion and suffered the agony mentioned in the New Testament. Its exact location is not known definitely at present, but is pointed out to tourists in a locality where a number of olive trees stand in an inclosure.

GETTYSBURG (gĕt'ĭz-bûrg), **Battle of**, a celebrated battle that occurred July 1-3, 1863, at Gettysburg, Penn., about thirty-six miles southwest of Harrisburg, and considered the turning point in the Civil War. The Union army was under the command of General Meade, and the Confederates under General Lee, each numbering about 80,000 men. The latter had invaded the Shen-

andoah Valley, crossed the Potomac at Williamsburg in the latter part of June, and was pressing forward to Harrisburg. General Meade had just superseded General Hooker in command of the Union forces, and his plan was to engage the enemy at Pipe Creek, but this was frustrated by the Confederates' attack on Reynolds' division at Gettysburg on July 1, when General Meade hastened forward to his assistance. The battle raged for three days with fearful carnage. On July 3 the Confederates made their last charge on the Union army, but met with fearful slaughter and were repulsed. As a result, Lee was obliged to retreat with his shattered columns across the Potomac into Maryland. The Union army lost 23,190, the Confederate nearly 30,000, the losses on both sides including many generals and officers. The successes at Gettysburg and Vicksburg occurred at the same time. Both being decisive, they greatly added to the enthusiasm of the north. The national cemetery at the town of Gettysburg was dedicated by President Lincoln, Nov. 19, 1863, and the government erected a magnificent monument in its center at a cost of $50,000. In this cemetery are the graves of 3,580 Union soldiers.

GEYSER (gī'sẽr), a word derived from the Icelandic name Geysir, meaning to burst or gush forth, and applied to intermittent



GEYSER, YELLOWSTONE PARK.

hot-springs in various portions of the earth. The most notable specimens include those in the Yellowstone region of the Rocky Mountains, New Zealand, Thibet, the Azores, and those of the southwestern division of Iceland, thirty miles northwest from Mount Hecla. There are about one hundred separate geysers in Iceland, situated within a radius of two miles. They throw out jets of hot water through steaming apertures at intervals lasting five or six minutes, though some throw jets continuously for a half hour. However, the Great Geyser and the New Geyser are the largest. The former has an opening about eight feet in diameter, and throws up columns of hot water to the height of seventy-five to one hundred feet. In the upper portion the opening is about fifty feet in diameter, which is gradually widening. Its action is preceded by subterranean noises resembling the firing of cannon, a slight movement of the earth's crust, and, after throwing up immense volumes of water, steam begins to take its place. After a time the fountain ceases to act, but the process is renewed after a short intervening period. The New Geyser, or Strokkur, as it is called by Icelanders, is supposed to be connected with Mount Hecla, which is, perhaps, true of all those in that region. The phenomenon is explained by Tyndall in that he thinks the water is brought to the boiling point under pressure, after which it explodes into steam, and this, occurring periodically, gives rise to the intermittent ejections.

The geysers in the Yellowstone region of the Rocky Mountains are the most picturesque and powerful yet discovered. About fifty distinct geysers are located within an area of thirty square miles in the vicinity of the Fire Hole River, and throw up water jets from fifty to 200 feet, though some jets rise to about 250 feet. Of these geysers Old Faithful is the most celebrated. It has an opening six feet in diameter, and at intervals of fifty minutes throws water to a height of from seventy-five to 150 feet. Another wonderful geyser is the Beehive, which acts once every twenty-four hours, and throws up a jet 175 feet. The geysers of New Zealand are situated in the hot-land district of Auckland, and present wonderful phenomena. In this vicinity are numerous natural terraces that form reservoirs for cisterns, and near them are thermal springs and boiling geysers. Several are characterized by emitting continually dense volumes of steam. It is known that geysers occur only in volcanic regions, and are connected more or less closely with earthquakes and volcanic disturbances. Geologists generally hold the view that their action tends to relieve the interior. It furnishes an outlet for matters under the action of heat or pressure, and in this manner counteracts and greatly modifies the more extensive volcanic disturbances.

GHENT (gĕnt), an important city of Belgium, capital of the province of East Flanders, situated in a fertile plain at the junc-

tion of the Scheldt and Lys rivers, and connected by numerous important canals and railroads. Several of the canals divide it into a number of islands, which are connected by 275 bridges. The city contains excellent public schools, numerous churches, several academies, and is the seat of a university. Among the public buildings are the St. Bavon cathedral, St. Michael church, St. Nicholas church, and several fine government buildings. There are also beautiful parks, gardens, and promenades. The university carries extensive courses of study. It has a library of 115,000 volumes and 750 manuscripts. There are manufactures of sugar, hosiery, tobacco, paper, ribbons, vehicles, machinery, cotton, linen, silk, and woolen goods. It is also the seat of many railroad construction shops, and has connections with the sea by a great canal, which articulates with the Scheldt River. The harbor is spacious and furnishes ample moorage for 450 vessels. It has enjoyed remarkable prosperity within recent years, owing to its conveniences in railroad transportation, has many beautiful streets, and is the center of much wealth.

Ghent is first mentioned in history in the 7th century. Baldwin, the first count of Flanders, erected a fortress on its site in the year 868 to defend it against the Normans. It was made the capital of Flanders in the 12th century, and in the 14th its army included 75,000 men. By reason of wealth and unity the people of Ghent were able to maintain their liberty and defend themselves successfully against the feudal lords, who came from Burgundy and Spain to encroach upon them. Jacob Van Artevelde led two revolts respectively in 1338 and 1369 against Burgundy, and in 1504 it was deprived of its privileges by Charles V. of Germany. This conquest caused its prosperity to decline, particularly during the reign of Philip II. of Spain. France conquered it in 1792 and made it the capital of the department of Scheldt. In 1814 it was added to the kingdom of the Netherlands, with which it was included till the separation of Holland and Belgium in 1830, when it became a part of the latter. The peace treaty between the United States and England, known as the treaty of Ghent, was made in 1814 and signed in that city. Population, 159,720.

GHERARDI (gā-rar'dee), **Bancroft**, naval officer, born in Jackson, Louisiana, Nov. 10, 1832. In 1846 he joined the navy as midshipman on the Ohio, a vessel of the Pacific squadron, and entered the Naval Academy in 1852. At the beginning of the Civil War he served on the Lancaster of the Pacific squadron, was made lieutenant-commander in 1862, and served with much distinction in the battle at Mobile Bay. In 1866 he was promoted commander. By successive promotions he became rear-admiral in 1886, and in that capacity supervised the grand review of the naval forces of the world at Hampton Roads in 1893. In 1894 he was placed on the retired list.

GHIBERTI (gee-bĕr'tee), **Lorenzo**, goldsmith and sculptor, born in Florence, Italy, about 1378; died Dec. 1, 1455. He was trained in the arts of a goldsmith by his stepfather, and later became skilled as a painter and sculptor. At the age of nineteen he began painting frescoes in Rimini, when he and seven other artists were selected to compete for the construction of a gate of bronze in Florence. The works of Ghiberti and Donatello were selected by the judges as the best, and the contract was awarded to Ghiberti, the latter having chosen for his design "The Sacrifice of Isaac," and completed the gate after working twenty-one years. Later he executed a second gate which consumed about as much time, and of these two products Michael Angelo expressed the view that they were worthy to occupy and adorn the entrance of Paradise.

GHIRLANDAIO (gĕr-län-dä'yo), **Demenico Corradi**, celebrated painter, born in Florence, Italy, in 1450; died Jan. 11, 1495. He was apprenticed at an early age to a maker of garlands, from which circumstance he was nicknamed the garland maker. In 1481 he became a painter and soon won distinction by much inventive power, and in the production of superior perspective designs. Among his frescoes are those of the Sassetti Chapel of the Trinity Church, and the choir Santa Maria Novella in Florence. Among his pupils was Michael Angelo, who drew much inspiration and skill from the work of this master.

GIANTS (jī'ănts), the persons having extraordinarily large stature, size, and bulk. History mentions giants and races of giants, but the occurrence of nations of giants is assigned chiefly to the early stages of civilization. Among the races of giants mentioned in historical legendry are the Læstrygones and Cyclopes, while in the English folklore are mentioned the Cornish and Welsh giants. The Bible makes mention of giants in Genesis vi, 4, in which the sons of Anak, who resided in the vicinity of Hebron, are described by spies as of such gigantic size and proportion that they themselves were relatively as small as grasshoppers. The Bible frequently mentions the Rephaim race of giants, also those of Emim and Zuzim. In Greek mythology giants are regarded largely as personifications of natural force, and the term became applied to anything possessing unusual or superior power. The natives of Patagonia, South America, have an average height of six feet, and are among the tallest of the living races.

While individual giants have existed at various times, there are at present persons who have a height, no doubt, fully as large as any that ever lived. Among the persons attaining to high stature may be named Maximim, a Roman emperor, who was nearly nine feet tall. Queen Elizabeth had a Flem-

ish porter who was seven feet six inches tall; Cajanus, a giant of Sweden, was nine feet; Patrick Cotter O'Brien, who flourished in Ireland in 1783, was eight feet eight inches, while the Swedish guard employed by Emperor Frederick William I., of Prussia, measured eight feet six inches. It has been found by careful investigation that giants die comparatively early and have a more feeble mind and body than persons of average stature. Their parts are usually out of ordinary proportion. Among the more prominent differences are broad shoulders and haunches, small forehead and brain, large jaw, weak muscular system, and the disproportion between the trunk and limbs greatest. Though the causes for unusual growth in the different parts is not understood, it is known that some portions grow more quickly than others, and often continue to gain in size after other parts have ceased to grow.

GIANTS' CAUSEWAY, a name applied to a natural formation of basalt resembling a series of columns. It extends into the North Channel from the coast of Antrim, Ireland. This formation is a portion of basaltic formations found in Antrim county, and near Londonderry. The Giants' Causeway is exposed for 300 yards, consisting of many thousands of vertical columns of largely six-sided formations, though many of them have five, seven, eight, or nine regularly formed sides.

GIBBON (gĭb'ŏn), **Edward**, noted historian, born in Putney, near London, England, April 27, 1737; died in London, Jan. 16, 1794. He was the eldest of seven children, six sons and a daughter. In 1752 he entered Oxford, where he studied fourteen months and adopted Catholicism, but was afterward reconverted to Protestantism while under the care of M. Pavillard, a learned minister of the Calvinistic faith at Lausanne, Switzerland. While at that place, where he spent five years, he studied German and French literature, Latin classics, and pursued with much diligence research in English, which, with his aptness and strong memory, made him a profound thinker and a learned scholar. He returned to England in 1758. Soon after he wrote several works in the French language, and in 1763 paid a visit to Paris and Lausanne. During the following year he journeyed in Italy. While studying the ruins of the Roman capital and visiting the various places of interest that became prominent during Roman splendor, he conceived the idea of writing his great history.

In 1774 he was elected from Liskeard to parliament, and for eight years supported the administration of North in its policies relating to America. The first volume of his "Decline and Fall of the Roman Empire" was published in 1776, after laboring seven years. It immediately gave the author a reputation. Subsequently he settled at Lausanne to complete his history, which he did on June 27, 1787, and shortly after retired to spend the remaining years of his life in quiet. His work is a masterpiece of history, glowing with vivid and lively imagination, and is told in a charming narrative style. It is a history of the civilized world for thirteen centuries, portrays the various epochs in which paganism gave way to Christianity, and thus spans a vast chasm between the old and the new. The adverse criticism offered to it is founded on the fact that he gives the early paganism a greater splendor than is thought to be fitting, and curtails the worth and substantial benefit of early Christianity. It is certain that his power of condensation and accuracy in regard to the principal historical facts have not been successfully impeached.

GIBBONS, James, Roman Catholic cardinal, archbishop of Baltimore, born in Baltimore, Maryland, July 23, 1834. He was ordained priest in 1861, and became assistant pastor at St. Patrick's church in his native city. Shortly after he was assigned as priest to St. Bridget's church, later transferred to the cathedral and appointed chancellor of the archdiocese. He became vicar apostolic of North Carolina in 1868, with the rank and title of bishop, and was assigned to the see of Richmond in 1872. His appointment as coadjutor to Archbishop Bailey of Baltimore was made in 1877. He succeeded the latter in the same year and became a cardinal in 1886, being the second American receiving this distinction. Among his published works are "Our Christian Heritage" and "Faith of Our Fathers."

CARDINAL GIBBONS.

GIBRALTAR (jĭ-bral'tar), a city in the southwest part of Spain, situated on the west side of a strongly fortified rocky peninsula of the same name, both belonging to Great Britain. The city occupies a site near the place where the peninsula terminates in Europa Point, and has a convenient and spacious harbor. It is a free port, has important commercial business, and is utilized by the British as a distributing station for their manufactures. Its principal street is about one mile long, with which others intersect at right angles. It has local government buildings, including barracks, theaters, naval hospital, the governor's building, several churches, and the admiralty. The chief export commodity from the city is wine, though there is a considerable trade in fruits, textiles, and machinery. Several remains of cathedrals of Moorish construction are in evidence, and near the city are the celebrated Alameda Gardens. The

lighthouse, built in 1841, is situated on Europa Point, casting a light 150 feet above the sea, and can be seen fully twenty miles. The population of the city, including the garrison of about 6,000 men, is 26,382.

The rocky peninsula of Gibraltar rises to an elevation of 1,410 feet, is three miles long, three-fourths of a mile wide, and connected with the mainland by a sandy isthmus known as the neutral ground. On the west is the Bay of Gibraltar, and its eastern and southern shore is washed by the open sea. Powerful artillery is planted on the entire rocky precipice. The south side is almost inaccessible, while the precipitous and rugged extremity on the west is made impregnable by powerful batteries. Caverns and galleries sufficient for the passage of carriages have been cut through the solid rock in various angular and parallel lines, and at intervals of twelve yards port-holes have been drilled, which serve for convenient heavy ordnance. There are also numerous caverns, of which the Hall of Michael is the largest, having a height of seventy feet, width ninety feet, and length 225 feet, with stalactite pillars supporting the roof. The entrance to this cavern is 1,106 feet above the sea.

This precipitous peninsula was known to the Greeks as Calpe. The Saracens, under their leader Tarik Ibn-Zeyad, first fortified it in 711-12, after whom it was called Gebel-al-tarik, from which its present name was originated. Later it fell into the hands of the Moors and was conquered by the Spaniards in 1462, who so strengthened the works that engineers considered it impregnable. After a vigorous bombardment by the Dutch and English forces in 1704, it was reduced and captured. The peace of Utrecht conveyed it to the English in 1713, in whose hands it has since remained, though desperate efforts to dislodge them were made by the French and Spanish in 1779, but they were completely repulsed after battling in vain for six days. It is no longer the key to the Mediterranean, since modern warships are able to pass it without sustaining effective damages by the guns of the fortress, and, besides, it is not at all likely that the fortress would hold out against modern implements of war. The rocky eminence of Gibraltar and Abjla, now called Ceuta, a precipitous cliff across the Strait of Gibraltar, were anciently called the pillars of Hercules.

The Strait of Gibraltar is a narrow channel connecting the Mediterranean with the Atlantic. At its narrowest point, west of Gibraltar, it is fifteen miles across. There is a constant current in the center of the strait into the sea from the Atlantic, an opposite current passing at the bottom along the coasts, into the ocean. The strait separates the Iberian peninsula from Africa.

GIBSON (gĭb'son), **Charles Dana**, illustrator and artist, born about 1865. He produced his first sketches in 1886, his earliest being "The Moon and I," which represented the moon and a dog confined by a chain baying at that luminary. Shortly after he painted promiscuously, depicting in a charming manner, and attracted wide attention. In 1892 his "Life Sketch" was exhibited in New York City, and the following year he made an extended tour in Europe. "The Collection of Eighty-four Drawings," representing various productions, was published in 1894. Other works were issued successively, among them "Canoeing;" "Going in to Dinner with the Duke of Sloppy Weather," and "Reading the Will."

GIDDINGS (gĭd'ingz), **Joshua Reed**, statesman, born in Athens, Penn., Oct. 6, 1795; died in Montreal, Canada, May 27, 1864. He removed to Ohio with his parents at an early age, was admitted to the bar in 1820, and in 1826 elected to the state legislature. He served as a member of congress for twenty years, beginning in 1838, being elected each time as a whig. His congressional record shows him in the light of an aggressive abolitionist. He was censured by a congressional vote in 1842 for endeavoring to justify the capture of the Creole by slaves, which caused him to resign and appeal to his constituents, who re-elected him by a large majority. The annexation of Texas and the compromise measure of 1850 met his active opposition. In 1860 he received an appointment as consul-general to Canada and died there before his term expired. His speeches were published in a volume in 1853. He wrote a work entitled "Rebellion: Its Authors and Causes."

GIDEON (gĭd'e-on), the youngest son of Joash the Abiezrite, and most celebrated of all the judges of Israel. His country had fallen into widespread idolatry during his youth and was plundered by the Amalekites and Midianites, and was actually under the supremacy of the latter. As Gideon grew to manhood he developed patriotism and religious zeal, and, when the people had reached a stage of resistance, he began to stir up their enthusiasm. By falling suddenly upon the enemy, he routed them at Mount Gilboa, pursuing them across the Jordan into the Syrian Desert. In the forty years of Gideon's reign the Israelites enjoyed peace and prosperity. The epistle to the Hebrews mentions him as a hero of faith. Though offered a kingly crown he religiously refused.

GILA (hē'lä), an important river of the United States, rises in the northwestern part of New Mexico, flows eastward through Arizona, and joins the Colorado at Yuma, about fifty miles from the mouth of the latter river. Its length is 590 miles. Among its tributaries are the Rio San Pedro, Rio Santa Cruz, and Rio Verde. The Rio Santa Cruz discharges into the Gila only part of the year, being lost in the sand much of the time. Ruins of a prehistoric people are found in

the Gila basin, and in its proximity are mines that yield gold and silver. The Gila monster, a poisonous lizard, the largest in North America, is found in the region of the Gila.

GILBERT, Sir Humphrey, celebrated navigator, half brother of Sir Walter Raleigh, born in Dormount, England, in 1539. He studied at Eton and Oxford and was destined for the law by his father, but afterward began a military career. He received an appointment in the army in Ireland, receiving the honor of knighthood for good services, and later served five years in the Netherlands. His work, "Discourse on the Northwest Passage to India," was published in 1576, and soon after he received letters patent authorizing him to occupy remote regions possessed by heathens and not claimed by any Christian people. He sailed in company with Sir Walter Raleigh in 1578, but met with no success. A second expedition was made by him to Newfoundland, of which he took possession in the name of Queen Elizabeth and planted a colony in 1583, but it did not prosper. While attempting to return to England in the latter year, the ship in which he sailed was lost and he perished in the waves.

GILDING (gĭld'ĭng), the process of applying gold-leaf to the surface of wood, plaster of Paris, leather, paper, metal, and various other substances. While the processes of gilding differ with the nature of the substance to be gilded and the kind of effect required to be produced, they may all be classified under three heads: mechanical gilding, chemical gilding and encaustic gilding. In a common method of mechanical gilding or oil-gilding, from four to ten coats of whiting mixed with white glue are applied, each in turn being smoothed down with sandpaper and a pumice stone. This surface receives the gold-leaf, which is put on by means of a brush. A false gilding, although an old invention, is now extensively used to make a cheap and quite durable gilding. The molding is first covered with silver-leaf or tin-foil and coated with a yellow paint. Metals are usually gilded by a process of electrotyping (q. v.), but, besides this, various methods of chemical gilding are employed. Water or wash gilding consists in applying to metal a wash of an amalgam of gold and mercury, afterward evaporating the mercury by heat, leaving the gold firmly adhering to the surface of the metal. It is worth noticing that this process of gilding is the best form, being more durable than electro-gilding, and is now used in the more costly kinds of decorative work. Fully 30,000 buttons an inch in diameter may be gilded with one ounce of gold. Other methods of chemical gilding are cold gilding, Grecian gilding, and gilding by immersion. Encaustic gilding is applied usually to glass and porcelain. An amalgam of gold, proto-sulphate of iron and turpentine, or other substances, is painted on the ware, and the whole is subjected to heat, which fixes the gold, the luster being brought out by burnishing.

GILEAD (gĭl'ē-ăd), a mountainous region in Palestine, lying east of the Jordan, and famous because of being allotted to the tribes of Gad, Manasseh, and Reuben as of much pastoral value for their large herds. The Scriptures mention its fertility in producing grasses and forests, and names Jabesh, Ramoth, and Jazer as its important cities. Among its rivers were the Arnon and the Jabbok. It was rich in aromatic plants.

GILLS (gĭlls), the respiratory organs of aquatic animals, as fishes, amphibians, mollusks, and crustaceans, serving to breathe the air dissolved in water. In fishes they consist of vascular processes of mucous membrane on either side of the neck. Water is taken into the mouth and forced out through the gill-slides, acting upon the blood as it circulates through the vascular fibrils. The gills in invertebrates are variously situated.

GILMAN, Arthur, educator and author, born in Alton, Illinois, June 22, 1837. He was educated in St. Louis and New York, received an honorary degree at Williams College, and in 1871 became an associate editor of the American Tract Society. Among his publications are "History of the American People;" "First Steps in English Literature;" "History of Rome," and "The Saracens."

GIN (jĭn), an alcoholic liquor distilled from grain and flavored with common salt, juniper berries, oil of turpentine, and various allied substances. In making gin, as in other beverages, each rectifier has his own recipe for regulating the quantities of flavor used. The most renowned article comes from Schiedam, Holland. Alcohol constitutes about fifty per cent. of high grade gin.

GIN, a machine used for raising weights. It may consist of three long poles fastened together at one end, having a pulley attached, and the poles set upright with the lower ends equal distances apart. A rope is passed through the pulley and fastened to a windlass, by the revolution of which the weight is raised. The gin for raising coal and other substances is made by erecting a shaft with a large drum, to which is attached a transverse beam, having a horse hitched at one end and driven in a circle. The horse-power is disappearing rapidly before the steam-engine, but the drum is still in common use.

GINGHAM (gĭng'am), a class of cotton dress-goods woven of plain dyed yarn, usually in checks or plaids. Real ginghams differ from calico in that the colors are woven with the cloth instead of being stamped on after weaving.

GINGER (jĭn'jẽr), a genus of plants indigenous to the East Indies, but now cultivated in the West Indies, South America, and in

West Africa. The ginger of commerce is obtained from the root-stalk, which is about the thickness of a man's finger. A very noted grade of ginger comes from Jamaica. It is used as a medicine, especially in a powdered form, and in preparing mild drinks.

GINSENG (jĭn'sĕng), a plant native to China and northern Eurasia and an important article of commerce. A species of ginseng is also native to the United States, and is dug for its root, which is marketable in China at from $2 to $4 per pound. The Chinese employ ginseng for aromatic purposes, but principally as a panacea in cases of bodily weakness, though its virtues are limited.

GIOTTO (jŏt'to), **di Bondone**, painter and architect, born near Florence, Italy, about 1276; died Jan. 8, 1337. He was endowed with such natural talent as an artist that he attracted the attention of Cimabue, on account of having drawn lambs of his father's flocks on stone. Accordingly he was taken to Florence for instruction in art. Twenty-eight frescoes of his earliest works are still preserved. These are particularly valuable on account of interesting scenes from the life of St. Francis. His skill consisted largely in the ability to group. He was able to give both simplicity and profound grace, and reproduced with remarkable exactness the beautiful in nature. Dante and other famous men of his time were his friends. As an artist he took high rank. His productions include "Coronation of the Virgin;" "A Last Supper," and "Seven Sacraments." The last named is still in a good state of preservation in the church of Incoronati at Naples. As an architect he executed the dome of Florence and also prepared the designs for the campanile.

GIRAFFE.

GIRAFFE (jĭ-răf'), or **Camelopard**, the tallest of quadrupeds, constituting a distinct family of ruminants, and the only species of its genus. It is a native of Africa, ranging from Nubia to the Cape of Good Hope. Giraffes are gregarious in habit, living in small herds, and feed on the leaves and small branches of trees. They stand eighteen feet or more in height, which is due to the long fore legs and neck. The body slopes back, legs are slender, and hoofs cloven. On the head are two protuberances called horns, which are covered with skin, hair, and bristles. The tongue is very long and prehensile, being employed to grasp food, for which purpose it may be protracted and retracted at will. The hair is short and smooth, of a reddish-white color, and marked with rusty-brown spots. Their peculiar gait in running resembles a pace. Giraffes are inoffensive, seeking safety in flight, and in captivity become docile and playful. Their flesh is eaten, being quite nutritious, but is not preferred as food by Europeans. They supply only a limited quantity of milk.

GIRARD (jẹ-rard'), **Stephen**, philanthropist, born in Bordeaux, France, May 24, 1750; died in Philadelphia, Penn., Dec. 26, 1831. He commenced life as a sailor at the age of thirteen, became captain in 1773, and later conducted important trade enterprises between New York and New Orleans. In 1777 he settled in Philadelphia and engaged in a mercantile career, attaining much success. Shortly before his death he founded Girard College, an educational institution in Philadelphia, by providing an endowment of $2,500,000. It has for its object the care and education of poor children. The buildings are substantial; the courses of study include mathematics, navigation, astronomy, philosophy, modern languages, and surveying. There is an efficient corps of instructors, selected with a view of special fitness. The value of the property at present aggregates $18,500,000, and the net income $1,150,000. Its students, though limited to boys, aggregate an average of about 1,750. The alumni includes some of the ablest and most eminent men of America. Girard also rendered valuable aid in the War of 1812 by loaning the government $5,000,000.

GIRARDIN (zhe-rar-dăn'), **Emile de**, journalist and statesman, born in Paris, France, June 22, 1806; died there April 27, 1881. He was the illegitimate son of General Girardin, assuming the name of his father in 1827, and was acknowledged by him in 1848. His first production was a novel entitled "Emile," which contained a plea for the rights of illegitimate children. He founded the "Journal" in 1830, a periodical devoted to economics, which soon after reached a circulation of 120,000 copies. Six years later he established the "Press," a one-cent newspaper devoted to the Orleanists in a conservative way. A quarrel on account of politics led to a duel with Armand Carrel, in which the latter was killed. Girardin soon after announced himself a decided republican, and promoted the election of Louis Napoleon to the presidency. When Napoleon became emperor, Girardin was in strong opposition and was exiled. Subsequently he returned to France, and in 1862 became the editor of "Liberty," in which he advocated the Franco-Prussian

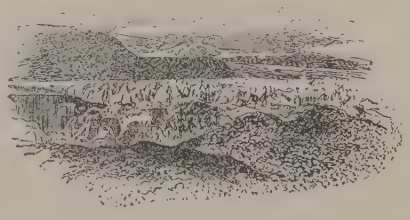
War. He founded the "France" in 1874, and later the "Little Journal," both giving support to the new republic. Besides numerous productions of a political nature, he wrote several pieces for the stage, and his wife, Delphine Gray, whom he married in 1831, had a reputation for much ability as a poetess.

GIRARDIN, Francois Saint-Marc, journalist and educator, born in Paris, France, in 1801; died April 11, 1873. He studied in Paris, graduating from the College of Henry IV., and traveled extensively in Germany and Italy. His early writings appeared as contributions to the "Journal of Debates." He was a minister for a short time during the revolution of 1848, but did not attain to eminence as a statesman. As a lecturer and journalist he ranks as one of the most spirited and skilled of modern France.

GIORGIONE (jor-jo'nâ), meaning Great George, celebrated painter, whose real name was Giorgio Barbarelli, born in Castelfranco, Italy, in 1477; died in 1511. He studied under Bellini, showed superior skill, and soon surpassed his master. His productions include many fine Scriptural views, pastoral, sylvan and other idyllic scenes. In Vienna he decorated several important buildings with frescoes. There are rare specimens of his portraits extant, chiefly in the galleries of Milan, Dresden, and Vienna. His best known productions include "Three Philosophers;" "Sleeping Venus," and "Family of Giorgione."

GLACIERS (glā'shĕrz), the immense masses of ice and snow that move almost imperceptibly from higher to lower levels, and occur most frequently in the higher mountain valleys or slopes. In the upper parts they consist of soft snow, which is later pressed into compact masses, and at the lower portion constitute clear, hard ice. The great quantities of snow that form above the snow line press in masses slowly down the slopes. By the pressure, due to the weight of the layers, the air confined in the snow is pressed out, and the lower part of the glacier is thus changed into a compact mass of pure ice. In some cases ice is formed from the snow by successive thawing and freezing, though this phenomenon more or less affects all glaciers below the snow line. Glaciers resemble rivers, since the solid material flowing into them passes as drainage into their basin. However, the current is much slower, often imperceptible. The larger glaciers, like rivers, have numerous affluents, and peculiarities of flow and velocity. Where tributaries unite and flow on with the main mass, they do not intermingle as the waters of rivers, but the mass coming from each may be distinctly traced throughout the remainder of the course. Owing to the diminished friction at the top and middle portions, these parts move more rapidly than those at the bottom or sides, and in this respect are similar to rivers. On the surface they are usually quite smooth, but at regular intervals in the direction of a valley, and in the slope of the bed, they are broken into deep fissures called crevasses. These occur most frequently at the bend of a valley, where one side is compressed and the other extended, and at such places the crevasses extend obliquely up the stream, and at abrupt descents in the bed directly across.

The crevasses vary from less than an inch to great chasms over one hundred feet in width, and in the larger openings the depth is generally greatest. On the surface the appearance is a dirty white, while down the walls of the crevasses the ice has an appearance of deep azure blue. Where glaciers flow from elevated mountains in the temperate climates, they usually melt in the warm months of the year as they proceed downward, and are thus transformed into streams of water. In this way they frequently give rise to rivers. Among the rivers that have their origin in glacier streams are the Rhine and Rhone of



MUIR GLACIER, ALASKA.

Europe, and the Ganges of Asia. The velocity of the ice and the rapidity with which it melts govern the extent of the glacier below the snow line. They retreat up the mountain during an unusually warm summer, following a light snowfall in winter, and, on the contrary, advance farther down the valley when heavy snows in the winter are followed by a cool summer.

Glaciers possess much transporting power, and carry to a lower level large volumes of stone and dirt which accumulate on the surface of the moving mass, after rolling down from adjacent elevations. The accumulations are called moraines, Generally the moraines are most abundant at the side of glaciers, where they are called lateral moraines; where two glaciers unite the meeting edges are marked by a moraine called the medial moraine, and at the end of the glacier a terminal moraine extends across the valley in a wide curve. Medial moraines one hundred feet in height are not uncommon, while terminal moraines attain to several hundred feet. The erosive power of glaciers is very effective and tends to greatly deepen the valleys through which they move. Evidences of extinct glaciers are found in many localities, and their former existence is attested by deep grooves cut in

the bottom and sides of the valleys, and also by deposits formed of rock, mud, and boulders carried by their moraines. When glaciers extend into the sea, like those of Greenland, the base is undermined by the warmer waters of the ocean, and the waves break off great fragments, which form floating mountains of ice called icebergs. These are carried into warmer latitudes by ocean currents, where they drop their load of moraine by melting. Icebergs appear most numerously in the north Atlantic, into which they descend from the extensive Arctic glacier region.

The total number of glaciers in the world is not less than 1,100, of which one hundred are of large size. In the tropical and temperate climates they abound only in the more elevated portions of mountains, while whole continents and islands are apparently covered by them at the poles. Those of the Antarctic regions are probably sheets of ice fully 10,000 feet thick. The Muir glacier, in Alaska, is about 150 miles long and 500 feet deep, and is probably the largest in the world. In the north polar region they abound extensively, but those of Greenland and the islands north of North America are the only ones known to any extent in that region. Others exist more or less widely distributed in the continents. Those of the central Alps of Europe have been studied with the best results. The most widely known of these is the Mer de Glace, which rises on the slopes of Mont Blanc, contains three large branches, descending into the vale of Chamouni. The longest glacier of the Alps is Aletsck, which has a course of fifteen miles, while the Aar glacier has an estimated depth of 1,515 feet, being regarded the deepest.

In the glacial period ice largely prevailed in what are now temperate latitudes. It began in the Newer Pliocene period and terminated before the close of the Post Pliocene, though Arctic conditions prevailed only at intermittent times. The occurrence of great glacial action is evidenced by numerous traces in North America and Eurasia. In the Alpine regions evidences of early glacial action are common, and it is certain that the plants now found on the summit of these mountains were brought down from Arctic regions at that time. Man existed during the latter part of the two distinct glacial periods traceable in the Alps. The cause of these phenomena in past ages is explained by Sir Charles Lyell by assigning to the north polar regions vast elevations, from which the streams of ice moved southward. Sir John Herschel attributes astronomical reasons, which seem the more probable. The chief cause assigned is the varying eccentricity of the earth's orbit. In 1800 A. D. it was .0168, but 210,000 years prior to that it was .0567, making the difference of 10,250,000 of miles, and the winter days 27.8 in excess. However, the possibility of astronomical causes is militated against by the absence of glacial periods prior to the Newer Pliocene time.

GLADDEN (glăd'ĕn), **Washington**, clergyman, born in Pottsgrove, Penn., Feb. 11, 1836. After graduating from Williams College in 1859, he was ordained minister of a Congregational society at Brooklyn. He served as pastor in North Adams, Mass., in 1866-71; in Springfield, in the same state, in 1875-83, and later in Columbus. In 1871-75 he edited the "New York Independent," and in 1878-80 the "Sunday Afternoon." He received degrees from the University of Wisconsin and Roanoke College. Among his writings are "Applied Christianity;" "Who Wrote the Bible;" "From the Hub to the Hudson;" "Young Men and the Church;" "Burning Questions of Life," and "Things New and Old."

GLADIATOR (glăd'ĭ-ā-tẽr), in Roman antiquity, a man who fought with deadly weapons against another gladiator or wild

ROMAN AMPHITHEATER.

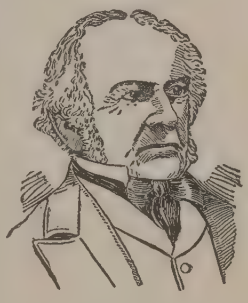
beast, especially in the amphitheater, for the amusement of the people. The first gladiatorial fight occurred at the funeral of Brutus in 264 B. C. between his sons, Marcus and Decius. Originally, a gladiator was a prisoner, slave, or criminal; later the performance became a mere spectacle, and knights, senators, and even women and emperors entered the arena. The gladiatorial exhibits were announced by private circulars or proclamations. Gladiators marched to the arena on the day of the per-

formance, where they were matched in pairs and their weapons formally examined. In many cases combats were fought between a man without arms, but provided with a net in which to ensnare his opponent and a three-pronged fork with which to spear him when caught, and an opponent in full armor, who sought safety in evading his enemy while seeking to pursue and kill him. The audience witnessing the combat became frantic with excitement, and yelled and applauded while rising in their seats, shouting their approval when ghastly blows were dealt, followed by blood spouting forth. In most places the arena was protected from the rays of the sun by a gorgeous awning, while strains of music floated in the air, drowning the cries of death. It was not uncommon to distribute Syrian perfumes to overcome by their odor the scent of blood, and the spectators were delighted by the most brilliant scenic decorations.

The gladiatorial battle opened at the sound of a bugle and a shout of command. A gladiator dropped his weapons when severely wounded, and as a plea for life held up his forefingers. This was sometimes in the gift of the people, but more often vested in the vestal virgins, and during the empire in the sovereign. Mercy was signaled by a waving handkerchief or by a turned down thumb, while all hope was forbidden by a clenched and upright fist; only the brave were accorded mercy. In the time of Julius Cæsar it was common to give exhibits by couples fighting. He gave a show in which 320 were engaged. Titus provided an exhibition that continued one hundred days. In it the gladiators fought with wild beasts. The great gladiatorial exhibition of Trajan engaged 10,000 men, who fought with each other and wild beasts, continuing 123 days. The wild beast fights were the most revolting, and by them many Christian martyrs lost their lives. Among the animals engaged were elephants, rhinoceroses, camelopards, hippopotami, tigers, lions, and many others of a ferocious nature. During naval fights the arena was flooded with water. A naval fight given by Augustus engaged thirty vessels, and during the combat thirty-six crocodiles were pursued and killed. The combatants were classified according to the arms they carried. Thus, one carrying a shield, helmet, sword, and breast armor, was called samnite; those carrying a lasso or noose, the laguearii; those armed with Thracian buckles and a short sword were known as secutores. Gladiatorial games were forbidden in the reign of Emperor Honorius, about 404 A. D.

GLADIOLUS (glȧ-dī'ō-lŭs), a genus of ornamental plants of the iris order. They have bulbous roots, a tubular two-lipped corolla, trifid stigma, and ensiformed sheathing leaves. There are many species native to South Africa and Eurasia. The flowers are beautiful, richly colored, and many varieties have been improved by intercrossing. In color they are greatly variegated, and include pure white, violet, crimson, scarlet, and yellow. Each of these is variously modified and shaded. As house plants they are popular, the majority of those cultivated in America coming originally from Cape Colony.

GLADSTONE (glăd'stŏn), **William Ewart**, statesman and author, born in Liverpool, England, Dec. 29, 1809; died May 19, 1898. He was the son of Sir John Gladstone, a Scottish merchant of London, entered Eton in 1821, and in 1831 graduated with marked honors from Oxord. In 1832 he was elected to parliament from Newark, and two years later became junior lord of the treasury under Sir Robert Peel. In 1841 he was made vice-president of the board of trade and master of the mint, supporting the policies of Peel. While serving on the board of trade, he abolished restrictive tariffs on the exportation of machinery, and in 1844 secured a reduction of railroad rates. His active support of the repeal of the corn laws lost him his seat for Newark, but he was returned in 1847 by Oxford University. With the death of Peel, in 1850, Gladstone surged to the front as a financier, and by his vigorous speeches against the budget of Disraeli became noted as one of the most eminent historic orators in parliament. In 1852 he became chancellor of the exchequer, which position he held during the ministry of Aberdeen, and a short time in that of Lord Palmerston. His speeches on finance became of much interest to the people and were always looked forward to with enthusiasm. In 1858 he was sent as high commissioner to the Ionian Islands, and about the same time went from the tories over to the advanced liberals. He was returned to parliament in 1865, and, after the death of Lord Palmerston, became liberal leader of the house of commons.



WILLIAM E. GLADSTONE.

Under the leadership of Gladstone a reform bill was passed in 1867 that greatly reformed the suffrage, the following year he carried measures abolishing compulsory taxes to support the church, and turned his attention to the distracted condition of Ireland. His seat for South Lancashire was lost in 1868, but he was elected for Greenwich, and the liberal majority in the new parliament made him premier. In 1870 the Irish land act was passed under his leadership, and shortly after a reformed election law was secured and the Alabama Claims were settled, but in 1874 parliament dis-

solved and the conservative party retired Gladstone from office. We next find him busy with literary and historical researches, but in 1880 he was again made prime minister, in which he continued, with only a short interval until 1886. During this time numerous important laws were passed, among them legislation affecting Ireland, an extension of suffrage and a reform of the civil service.

His vigorous advocacy of home rule for Ireland resulted in an adverse decision by the people, and he was succeeded by Lord Salisbury. His leadership of the opposition in parliament continued and resulted in the formation of the Gladstonian party, with its principal tenet home rule for Ireland. This issue submitted to the people in 1892 again brought Gladstone forward as prime minister, but he soon after retired from public service on account of impaired health and old age. Gladstone had implicit faith in the people; held that freedom operates to make men better and more competent, and ranked highest as a lawgiver, diplomat, and patriot among the statesmen of England of the last century. Among his numerous writings are "Study of Homer and the Homeric Age;" "Impregnable Rock of the Holy Scripture;" "Financial Statements;" "State in its Relations with the Church;" "Special Aspects of the Irish Question;" "Vatican Decree Bearing on Civil Allegiance," and "State Persecutions of the Neapolitan Government."

GLASGOW (glăs'gō), the largest and most important city of Scotland, situated on the Clyde River, in Lanark county. The southern part of the site is level, while the northern portion is situated largely on convenient elevations of different height. Many of the streets are platted at right angles, wide and straight, and the buildings mostly of freestone. For architectural beauty Glasgow ranks among the best cities of Britain. A cathedral in the northeastern part of the city is the most historical structure, was commenced in 1240, and completed within 200 years. The style is Gothic; length, 320 feet; breadth, sixty-three feet; height, ninety feet, with a spire from the center 225 feet. Among the buildings of modern structure are the city chambers, numerous churches, and the University of Glasgow founded in 1540. This university has a library of 190,000 volumes and an attendance of 2,050 students. Other higher institutions of learning are the Free Church College, Glasgow and West Scotland Technical College, St. Mungo's College, St. Margaret's College for Women, and Anderson's College of Medicine. The city possesses splendid parks, numerous boulevards, electric lights and street cars, telephone and telegraph connections, and is the junction of numerous railroads. Among the manufactures are woolen, cotton, silk, and linen goods, calico prints, dyed and bleached textiles, iron and steel, machinery, chemicals, pottery, tobacco, sugar, glass, beverages, jute, and leather. In 1895 a central underground railroad was opened for traffic, which affords rapid transit to many parts of the city.

The importance of Glasgow at first rose from its location on the Clyde, which permits navigation by large vessels. By means of canals the interior highlands and adjacent districts are reached. Its harbor and docks are very extensive, and near them are vast marine-engineering and shipbuilding yards, which are noted for a large output of excellent vessels. In the vicinity of the city are abundant deposits of coal and iron stone, by means of which the manufacturing enterprises have been largely facilitated. The city was founded in 560 A. D., when the Celts that populated the region were induced by St. Kentigren to embrace Christianity and a small church was erected on the site of the great cathedral. However, its prosperity began in 1707, when its commerce became widened and shipbuilding took on large proportions. At present it has seven representatives in parliament. Population, 740,340.

GLASS (glăs), the compound product of silica, having at least two metallic oxides, the most common being those of calcium or lead, and potassium or sodium. It is brittle and sonorous at ordinary temperatures, generally transparent or translucent, and is made soft and ductile by heating. The point of melting and fusion varies with its composition. Hydrofluoric acid acts upon it, though ordinary solvents do not. It breaks with a vitreous fracture. Its discovery is not known, though as a commodity of utility and commercial importance it is as old as any known production of man. The Egyptians made use of glass before the Hebrew exodus. Their monuments and ruins bear evidence that they used it for vases, beads, and various ornaments as early as 3250 B. C. The Assyrians, Babylonians, Phœnicians, Greeks, and Romans were all more or less acquainted with and skilled in its manufacture. The vases made by the Romans were among the most beautiful productions of their arts, being finely finished by engraved figures and relief forms, variously colored on shaded background, and sometimes more or less transparent. Among the surviving specimens still preserved is the famous Portland or Barberini vase, though relics of inferior productions of great antiquity are abundant.

The use of glass for windows is much newer than its manufacture for other purposes. It was not used in buildings until 250 years after the beginning of the Christian era. Europeans began to use glass extensively to admit light into dwellings and public buildings in the latter part of the third century, though for church purposes it was used fully four centuries earlier. The early Puritan settlers of Jamestown, Virginia, began

its manufacture in 1608, and from their rude beginning it has sprung into a vast industry. The production of glass in the United States represents a total annual value of about $28,500,000. Practically all classes are manufactured, and several varieties, such as pressed glass, are American inventions. The principal manufactures of Europe are located in Germany, Belgium, and France, though the enterprise is carried on with more or less success wherever civilization extends. In window glass the American product exceeds all others in quality, while in the finer plate glass and the grade used for optical instruments the manufactures of Europe still exceed those of the United States. Among the states producing glass extensively are Pennsylvania, New Jersey, New York, Massachusetts, Indiana, Ohio, and Missouri.

In manufacturing the various kinds of glass different materials are used, such as fine sand or powdered flint, together with salt, alkali, alkaline earth, or metallic oxide. Crown, sheet, and plate window glass are made of silica, lime, and soda; flint glass used for dishes, lamp chimneys, goblets, and bottles is more brilliant and tough than window glass, and is made of silica, lead, and potash, though some forms of bottle glass are made of a variety of mixtures containing alumina. Any kind of glass may be colored by metallic oxides, though other substances are employed. In applying the coloring matter it may be mixed with the other ingredients while in a melted state, or a partially colored effect may be secured by taking the melted material from two vessels—the one colored and the other transparent—and in manufacturing the product so construct the desired article that a coat of colored glass will cover the other. Alumina and silver produce a yellow color; copper, gold, and oxide of iron, reddish; cobalt, bluish; oxide of copper and oxide of iron, the greenish; chloride of silver with peroxide of iron, the orange. To destroy the transparency of glass it may be roughened on the surface, when it is called frosted glass, and has the appearance of hoar frost. It is used in buildings where light is admitted, but the view obstructed. Among the most important properties of glass is its transparency, and, next to it, its effective resistance to acids. When heated, it can be formed into all shapes, spun into fine threads and used for ornaments and wearing apparel, and is a very efficient non-conductor of heat. When cold, it is most effectively cut by the diamond.

In glass manufactories the furnace is constructed of fire-brick. Two openings are arranged in the furnace; one contains large melting pots, and the other is employed to facilitate placing the half-blown product into the heat for softening it. Gas and crude oil are used for fuel, as most other fuels emit too much smoke. The melting pots are of the best fire-clay and cement, usually three feet high, about four feet in diameter, open at the top, and made with much care in order to bear the immense heat required in melting the sand and other materials of which the glass is made. Under ordinary care pots serve about two months, and the furnace about two years, though neither should be allowed to cool. The melted material contained in the pots is dipped by workmen with an iron tube, called a blowpipe, this being turned over and over until a sufficient quantity gathers and assumes an oval form. After placing the melted glass in a proper mold, it is blown and formed into the desired shape, such as a bottle, vase, tumbler, or some other vessel, this depending on the mold used.

The engraving on glass is effected by means of a sand-blast, while glass cutting is done by a process of grinding on a cast-iron wheel, with which water and sand is brought in contact. The ornamentation is not put on until after the glass has been annealed, a process under which it is gradually cooled, and requires about thirty-six hours. Sheet glass is made by taking the melted material from the pot, when it is blown and whirled until it assumes a cylindrical form; next the ends are cut off, the cylinder cut longitudinally and the sheet heated, pressed, and rubbed until it is flattened out. Plate glass is made by pouring the melted material upon a table, which has a marginal edge equal in height to that desired for the thickness of the glass. It is then flattened out by a roller passed over the table, resting on the edges, and thus secures equal thickness throughout. In making stained glass the paint, usually compounded of oxide of metals and oil of turpentine, is applied when cold and the colors are afterward stained into the glass by heating the latter. Mosaic glass painting is a department of art painting, and is not to be associated with glass manufacture. The most common is executed with enamel or stain, though stained glass is often used for the background.

GLASTONBURY (glăs'ẹn-bĕr-ẹ), a town of Somersetshire, England, on the Brue River, about twenty miles southwest of Bath. It is famous on account of the legend that Joseph of Arimathea came there with the Holy Grail and founded the first church in Britain. The abbey is one of the oldest in England. Population, 4,160.

GLAZING (glāz'ĭng), the art of imparting a smooth, shining surface to anything, such as pottery, gunpowder, and paintings, to prevent them from being penetrated by fluids. The most common mixture for earthen vessels is constituted of ground flint with oxide of lead, which is generally used, but in various proportions and with different tints.

GLENDOWER (glen'dōōr), **Owen**, celebrated Welsh chief, last native to assume the title of prince of Wales, born in Montgomeryshire, in 1349; died Sept. 2, 1415. He

was called to the English court, where he became a favorite of Richard II., and later esquire to Henry IV. Lord Gray seized some of his lands in the early part of the reign of Henry IV., and, failing to secure assistance from the king, Glendower took up arms to establish the independence of Wales. After conducting a war with more or less success, he succeeded in taking Lord Gray and Sir Edward Mortimer prisoners in 1402. Two years later he formed an alliance with Charles VI. of France against England, and secured the assistance of a powerful French army. The war was carried on for many years, and a pardon was offered him several times on condition that he would submit, but this he refused to do and continued to harass the English king until his death.

GLENS FALLS, a city of Warren county, New York, on the Hudson River. It has several railroads and is important for its manufactures. Among the productive establishments are machine shops, iron foundries, brick works, paper mills, and cigar, shirt, and furniture factories. There are electric street railways and lights, a ladies' seminary, and it is the seat of Glens Falls and St. Mary's academies. The surrounding country contains valuable deposits of limestone and black marble, and a famous cave. Population, 1900, 12,613.

GLEYRE (glare), **Marc Charles Gibriel**, celebrated painter, born in Chevilly, Switzerland, May 2, 1806; died May 5, 1874. His parents died when he was nine years of age, when he was placed under the care of an uncle at Lyons, and spent four years at Paris in the study of art. Later he resided in Rome, traveled extensively in Greece, Asia Minor, Egypt, and Nubia, and on returning to Europe opened a studio at Paris. In 1840 he exhibited his "Apocalyptic Vision of St. John," by which he attracted favorable attention. In his paintings he exercised much care by being slow in execution, and succeeded in giving an effect that always pleased. A number of his works won medals, and, while exhibiting at the Retrospective Exhibition in behalf of exiles in Alsace and Lorraine, his death occurred suddenly. Among his productions are "Young Nubian;" "Separation of the Apostles;" "Dance of Bacchantes," and "Earthly Paradise."

GLOUCESTER (glŏs'tẹr), a river-port and city of England, on the Severn River, about ninety miles northwest of London. Numerous railroads and excellent canals facilitate important commercial enterprises, while its manufactures of fabrics and machinery are considerable. Besides its public school system, there are the grammar school of St. Mary de Crypt, a theological college, a collegiate school, a public library, and an excellent park. Among the most noteworthy buildings is the cathedral, one of the largest in England, being 140 feet wide, 420 feet long, and its tower 225 feet high. It contains the Great Peter's Bell, weighing more than three tons. Population, 39,670.

GLOUCESTER, a port of entry in Essex county, Massachusetts, twenty-eight miles northeast of Boston. The city has waterworks, electric and gas lights, fine pavements, electric railways, and is connected with the principal cities of the east by a network of railroads. It is distinctly a commercial city, and its domestic fisheries are the most important in America. Those employed in mackerel and cod fishing include about 5,000 persons, and the annual catch aggregates about 10,000,000 pounds. It is the seat of the United States piscicultural station, has a large volume of foreign trade, and contains a convenient harbor. There are manufactures of clothing, machinery, mucilage, tents, seines, sails, canned fish, and granite products. The manufactories represent a capital of $3,500,000 and employ 2,000 persons. In 1765 it had a population of 3,763, since which time it has grown steadily, and in 1900 contained 26,121 inhabitants.

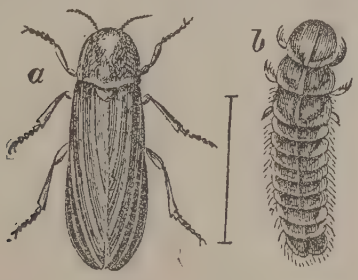
GLOUCESTER CITY, a railroad center of Camden county, New Jersey, on the Delaware River, and connected with Philadelphia by steam ferry. Its industries are fishing and manufacturing, the product including canned fish, calicoes, ginghams, and machinery. Population, 1900, 6,840.

GLOVE (glŭv), a covering worn on the hand, having a separate sheathe for each finger. Gloves are made of various materials, such as silk, wool, linen, cotton, fur, and different classes of leather. Several kinds of the finer gloves are manufactured of the real skins of goats, but most kid gloves are made of lambs' skins. The so-called dogskin, buckskin, and doeskin gloves are manufactured chiefly from sheepskin. In manufacturing this class of gloves the leather is dressed as light as possible, and each glove is cut by means of a die. Much of the sewing is done by machinery. The glove is stretched over a metal hand, which is first heated on the inside, and the material is smoothed or dyed as desired. Gloves are cleaned with oil of turpentine, camphor, or benzine; the last is the cheapest and most serviceable substance now in use. Machine sewing is used largely in the cheaper grades, the best being hand-stitched. Gloversville, New York, contains large gloveworks, though factories are distributed extensively. The finest and most expensive gloves produced in the world are made in France.

GLOVERSVILLE (glŭv'ẹrz-vĭl), a city of Fulton county, New York, on the Cayadutta River, forty miles northwest of Albany. Its streets are mostly broad and well paved. There are electric lights and street railways. The city is connected conveniently by railroads. Among the general facilities are an abundant water supply, numerous periodicals, excellent public schools, and a public library with 10,000 volumes. Its industries include the manufacture of machinery

vehicles, cigars, gloves, and buckskin and other mittens. In the manufacture of gloves it takes very high rank among the cities of America. The total annual product of manufactured articles aggregates a value of $16,500,000. Population, 1900, 18,349.

GLOW WORM, a name applied to several species of serricorn beetles. They somewhat resemble a caterpillar and are remark-



GLOW WORM.
a, male; *b*, female.

able for the luminosity of some of the segments of the abdomen. The male has wings and emits a very faint light when flying about at night, and is attracted to the female by her soft, but strong light. The luminous matter is capable of mixing with warm water, which increases its brilliancy. Though both sexes are luminous, the light in the female is much stronger, and the latter is wingless.

GLUCK (glük), **Christoph Wilibald Ritter von**, celebrated musical composer, born in Bavaria, Germany, July 2, 1714; died in Vienna, Nov. 15, 1786. He secured early training in music at Prague, but later studied in Vienna, and in 1738 went to Italy to complete his musical education under Sammartini. His first opera, "Artaxerxes of Metastasio," appeared in 1741 and was acted at Milan. Later he produced numerous others, returned to Vienna, and in 1745 was invited to London, where he met a prolific rival in Handel, who had gone there from Germany. Later he produced numerous operas at Vienna, Rome, and Naples. His style is noble and grand, and by consecutive and studious devotion elicited the admiration of all Europe. Among his most noted productions are "Fall of the Giants;" "Orfeo;" "Antigone;" "Alceste," and "Iphigenie."

GLUCOSE (glū'kōs), a sugar found largely in the vegetable kingdom and in honey. It occurs also in animal substances, as in the blood and liver. Another name for it is grape sugar or starch sugar. It is less sweet than cane sugar, and is manufactured in considerable quantities both in solid and liquid forms. A report made in 1840 by a committee of the National Academy of Science to the commissioner of internal revenue placed the sweetening power of ordinary glucose at about two-thirds that of cane sugar. The manufacture in the United States is principally from corn and in Europe from potatoes. Its use is mostly for table syrups and confectionery, though it is also employed in making artificial honey, in brewing beer and ale, and as a valuable food for bees. In the production of artificial honey the comb is made of paraffine, and the cells are filled by machinery with a pure grade of glucose. Though less sweet than real honey, it is inviting, has a fine appearance, and can be sold at about one-half the price of genuine honey. As bleached grape sugar it is often mixed with table sugar and is used largely in the manufacture of condensed milk. A bushel of corn yields from thirty to forty-five pounds of glucose. Manufacturers recognize four substances in corn, all of which are useful, but they need to be separated in order to secure the product desired. They comprise starch, oil, gluten, and bran. The first process in manufacturing is to soak the corn in water, in large wooden tanks, which hold from 500 to 1,000 bushels of corn. A temperature of 80° Fahr. is necessary, and fumes of burning sulphur are injected for the purpose of dissolving the gummy properties that bind together the gluten and starch. After soaking from one to three days, the corn is washed with fresh water and ground between corrugated rollers and crushed. Next the crushed material is placed in tubs and stirred mechanically with the view of separating the germs from the other portions. This is done for the purpose of afterward extracting the oil in the germ, which is about fifty per cent., and is valuable as a salad oil, for mixing paints, and in making toilet soaps. The oil is extracted from the germs by means of powerful hydraulic pressure of about 4,000 pounds, which causes it to run in a stream into tanks below, and the residue is utilized as a valuable food for cattle. Next the gluten is removed from the starchy matter by means of a filter press, and dried and sold at about $18 per ton for cattle food.

After practically all the ingredients unnecessary in the manufacture of glucose have been removed from the starchy material, the residue is mixed with water, and, by a process of filtering several times under the influence of sulphuric and muriatic acid, it is converted into a syrup. The converting is done most effectually under a pressure of from twenty-five to forty pounds, the starch being heated by means of steam, about an hour being necessary to complete the process of converting starch to glucose or grape sugar. The product at this stage contains about thirty-five per cent. of solid matter and is of a yellowish-brown color. To clarify it the liquid is passed through animal charcoal, by which all foreign substances and the coloring matter are removed, though for the higher grades a second filtration is necessary. After this process, the liquid is evaporated in a vacuum until it has reached the desired consistency for syrup or takes on the form of sugar. The manufacture of glucose from beets differs somewhat from

the process employed in using corn, though the latter steps are similar. The amount of corn consumed daily in the manufacture of glucose in the United States is about 50,000 bushels, though the quantity varies somewhat with the price of corn and sugar, many factories limiting the output when corn is high in price and sugar cheap, and increasing the capacity when the reverse is true. Within recent years glucose manufactured from beets has been encouraged under government supervision, and has attained to the rank of an important industry. See **Sugar.**

GLUE, a viscid cement or adhesive preparation, usually a form of impure gelatin derived from boiling certain animal substances, and used for uniting pieces of wood and other materials. It is made largely of the offal and heads of fish in seacoast towns, and from remnants of slaughter houses, such as the feet, heads, bones, and sinews of hogs, cattle, and sheep. In some places it is also made largely from the fleshings, ears, horn piths, and intestines. These portions are freed from dirt and hair, and afterward utilized in the manufacture by boiling. The product is sold in the market either as thin, hard, brittle cakes, which are afterward dissolved for use, or in a liquid form ready to be applied. Gelatin is made much the same as glue, but the parts used are selected with a view of making that product, and are also cleaned with greater care. Fish glue is made of isinglass dissolved in water. Commercial isinglass glue is manufactured of isinglass soaked in cold water, which, when swelled, is put in spirit of wine and later powdered chalk is added. Marine glue is made of equal parts of caoutchouc and shellac dissolved separately in naphtha, and then mixed. Waterproof glue is derived from isinglass, for which purpose it is boiled in skim-milk until the requisite consistency is obtained. Fish glue is used largely in making fine confectionery and as a gum for sealing letters.

GLUTTON (glŭt't'n), a carnivorous mammal of the badger family, ranging intermediately between the weasel and bear. It is found in the northern part of Eurasia and North America, extending as far south in the United States as Great Salt Lake. The common name applied generally is wolverene. Its fur is a valuable article of commerce, being used for muffs and sleigh robes.

GLYCERINE (glĭs'ẽr-ĭn), an oily, transparent liquid compound, nearly colorless, with a sweetish taste. The different varieties are obtained by the decomposition of animal fats and some vegetable substances under treatment with alkalies, or superheated steam. It was first discovered by Scheele in 1779 while saponifying lard with the oxide of lead. Glycerine serves many useful purposes, among them as a preparation to keep more or less moist substances useful in the arts, such as paper for printing, tobacco, modeling clay, and materials used in rope making, spinning, weaving, and tanning. It is employed to lower the freezing point of water, as a preservative of meat and natural history specimens, and is the basic substance for many chemical products, among which nitro-glycerine is one of importance. It is insoluble in ether, absorbs moisture from the air, and may be dissolved by a mixture composed of alcohol and water. In the manufacture of soap it serves a useful purpose in that it has the tendency to soften the skin, and as a medicine it enters largely as a soothing and healing substance. Manufacturers of confectionery employ it. It is also employed as an adulterant of beer, wine, and milk, and is itself adulterated with cane sugar and glucose.

GNAT, a genus of insects found in marshy places, having wings laid flat on the back when at rest. The mouth of the female

GNATS.
Stages of Development.

is furnished with a long, projecting proboscis adapted for piercing the skins of animals and sucking the blood, while the male has a proboscis with feathery-like projections more suitable for sucking honey from plants. The eggs of the gnat are laid on the surface of stagnant water, hatching in about three days, and live in the water until fully grown. Several generations of gnats hatch in a single summer. The common mosquito belongs to this genus of insects.

GNEISS (nīs), a term introduced from the German to designate a variety of metamorphic rocks composed of mica, feldspar, and quartz. It differs from granite in that the constituents are arranged in layers instead of a confused aggregated mass. Gneiss was originally sand or mud, being acted on by heat in the course of time, and converted into a hard, tough crystalline rock. It is

found in New York, the New England States, and various portions of Eurasia.

GNOSTICISM (nŏs'tĭ-sĭzm), a system of philosophy devised to solve the origin of evil, and which flourished extensively from the 1st to the 6th centuries. It occupied a middle ground between Christianity and paganism, holding that knowledge rather than faith is the key to salvation, and teaching that there is an eternal God of infinite power, wisdom, and goodness. While there were many systems of gnosticism, all gnostics agreed that God is incomprehensible; that all the natural and spiritual existences are derived from emanations from the supreme Deity, and that Christ was a superior emanation.

GNU (nū), a kind of antelope found in small herds in South Africa, belonging to the ruminating animals. The hair is black

GNU.

or yellowish, and bristly; the mane white and stiff; the tail like that of a horse, and the average length nine feet. In all species the female is somewhat smaller than the male, but both have horns, cloven feet, and move with a gallop like a horse. When caught young, they can be domesticated and yield fine flesh.

GOAT, a hollow-horned ruminant quadruped allied to the sheep, but differing from them in having horns erect, arched forehead, short tail, and a bearded chin and characteristic and unpleasant odor in the male. Goats are common to mountain regions. They are skilled in passing over precipitous and rocky ledges, springing with much precision from rock to rock, and subsist on coarse and scanty food. It is thought that the domestic goat descended from the wild species of western Asia, since they resemble those largely in size, form, and habits. There are many varieties, but they are commonly subdivided into goats proper and ibexes. Some are valuable for the production of wool or hair, flesh, and milk. Many species are reared extensively in Eurasia for their flesh, which resembles mutton, and general dairying purposes. The skin yields leather known as morocco, which is valuable in the manufacture of gloves and shoes. The intelligence of goats is proverbial, many species being known for their playfulness, ingenious habits, skill in seeking protection, and contriving cuteness in obtaining food. There are innumerable species that are domesticated in all inhabitable portions of

ROCKY MOUNTAIN GOAT.

the world. The food consists principally of grass and herbs, though they partake of many forms of vegetation and are fond of the younger shoots and bark of some varieties of trees. The Angora goat (q. v.) has silky hair eight or nine inches long hanging in curly locks from its sides. It is of silver-white color and useful in the arts and manufactures. The Cashmere goat (q. v.), a native of Cashmere, is rather undersized and has fine silky hair. Other species, including the Maltese and Nubian goats, are known for their superior milk, skin, and flesh. The Rocky Mountain goat is a native of the western portion of the United States, where it is also known as the goat antelope.

GOBI (gō'bē), **Desert of**, a vast stretch of desert in central Asia, called Shamo or sand-sea by the Chinese, and included in China, Turkestan, and Mongolia. Its length is about 1,750 miles, breadth 375 miles, and area 290,850 square miles. The general elevation above sea-level is 4,000 feet, and its boundary is designated by a gradual rise in a series of marked terraces and several interior rivers. Its central point is at Ozon Khoshu, which is also the lowest point in central Asia, and is elevated above the sea 1,945 feet. The interior is thought to have formed a vast sea in former times, but now is occupied more or less by different Mongolian tribes, who utilize the region in rearing vast numbers of sheep, horses, cattle, and camels.

GOD, or Supreme Being, the infinite, eternal, immutable Creator and Preserver of all things, and the object of human sacrifice and worship. In Christian theology there is a general agreement that God is a perfectly good, true, and righteous personal spirit; that he is eternal, and that he possesses omnipotence, omnipresence, and omniscience.

There is also a general agreement among Christians as to the trinity of God; that is, he is held to be one individual, but constituted of three persons—God the Father, God the Son, and God the Holy Ghost. The three are held to have existed from eternity, not as three distinct beings, but as one God, the glory equal, and the majesty co-eternal. In the doctrine of the trinity, which is most elaborately defined in the Athanasian Creed, neither the persons of the Godhead are to be confounded, nor the substance divided. God the Son is worshiped as Jesus (q. v.), who came to the earth, born of God and the Virgin Mary, to redeem fallen man under a plan of salvation instituted by the merciful God for his creatures. The Holy Ghost, the third person of the trinity, the Father being the first and the Son the second, is held to proceed from the Father and Son, though equal to them in substance and majesty. His function as a spirit of holiness is to apply to the hearts of men the benefits of Christ's death, and to sanctify them by inducing a belief in the truth as it is in Jesus. The Jewish people generally hold to the belief in Jehovah (q. v.), but reject Christ as the redeemer, and believe that the Saviour is yet to come.

Practically all peoples, even the most savage, manifest belief in a being higher than man. There seems to be an innate feeling, a potent something, in man that renders him a worshiping being and leads him to stand in awe when contemplating the greatness and wisdom of the Creator and Preserver of the universe as a whole, and of the immutable laws under which organic and inorganic substances either multiply their kind or endure without change. Within man dwells either a living faith in the superiority of his power to nature, which induces a feeling, an experience, that grounds his belief in God, or he denies his superiority to nature and is without faith in God, in which aspect he experiences nothing in existence but necessity and fate. Hence, the argument for the existence of God is based upon certain fundamental principles involved in our mental and moral being, such as causation and design. The existence of God is also argued from the manifestations he has made to man, either by miracles, visions, or personal contact, but even Christian theists admit that they cannot be accepted as real unless faith in the divine existence was previously held by those receiving them.

Various terms are employed to designate belief or disbelief in God. Theism is a system of belief in God as the Creator and Preserver; atheism implies, not a denial of the existence of a Deity, but an absence of any definite idea on the subject; polytheism is the doctrine that there are more gods than one, and agnosticism is the belief that God is unknown or unknowable. Monism is the doctrine that attempts to explain the cosmos by one principle of being or ultimate substance, and may be materialistic, idealistic, or pantheistic. Materialistic monism holds that all spiritual phenomena are from matter; idealistic, that both spiritual and material phenomena are from spirit; and pantheistic, that both mind and matter are from one original substance, neither being substantial. Materialism is a denial of the doctrine that man possesses any immaterial part. Fetichism is a form of worship which implies the ability of man to force the Deity to comply with his wishes, and totemism is a form of nature-worship in which stones, trees, rivers, etc. are adored.

GODAVARI (gō-dä'vär-ē), a river of central India, the largest stream of the Deccan. It has its source near the Indian Ocean, and, after a course of 900 miles, enters the Bay of Bengal by a delta of seven mouths. The entire basin drained includes an area of 112,000 square miles, a large portion of which is fertile. Along its banks is much beautiful natural scenery. At various places the water is led by canals from the narrow channel and utilized for irrigating purposes. The river is held sacred by the Hindus, and is the objective point of numerous pilgrimages. Its tributaries include the Wurdah and Manjera.

GODFREY OF BOUILLON (god-frwä' bōō-yŏn'), Christian knight and leader of the first Crusade, son of Eustace II., born in Baisy, Belgian Brabant, about 1061; died July 18, 1100. He first attained distinction in the German campaigns under Henry IV. in Germany and Italy, was made duke of Bouillon, and later elected leader in the first Crusade. In 1095 he conducted an army of 80,000 men by way of Constantinople, defeated the Egyptians at Ascalon, and soon became master of all Palestine. Subsequent to the capture of Jerusalem he was elected king, and strengthened himself with his chief supporters by establishing a system of feudal laws. Tasso made him the leading character in "Jerusalem Delivered." Many of the poems of the Middle Ages contain allusions to him.

GODIVA (go-dī'vạ), **Lady.** See **Coventry.**

GODWIN, earl of Wessex, born in the latter part of the 10th century; died April 7, 1053. At first a cowherd, he rose to the rank of nobleman. Subsequently he took a prominent part in advocating Edward the Confessor for the throne in 1042, and shortly after the latter married his daughter, Editha. Owing to the dislike of Edward for the Normans, the marriage proved an unhappy one and was the means of causing a quarrel between Godwin and the king, and the former was banished. However, Godwin landed with an army in 1052 and forced the king to restore to office his family and others of Norman descent. Harold, the last Saxon king, was his son.

GOETHE (gö'tẹh), **Johann Wolfgang von,** celebrated author, born in Frankfort-

on-the-Main, Germany, Aug. 28, 1749; died March 22, 1832. His father, Johann Kaspar Goethe, attained to the position of imperial councillor, being a man of affairs and a patron of learning, and held a doctorate of law. Young Goethe secured his early education in his native city, but in 1765 entered the University of Leipsic, where he pursued a definite course of study and also devoted much attention to music, art, and the drama. In 1770 he studied law at the University of Strasburg, in accordance with the desire of his father, but continued the study of his favorite literary work, and, after receiving a degree, returned to Frankfort. Shortly after he settled at Wetzlar to practice law, but did not find that profession congenial. In the love he bore a betrothed lady and the fate of a youth named Jerusalem he found a prolific subject for his work that marks an epoch in German literature, entitled "Sorrows of Werther." About the same time he published the "Wanderer," "Wanderer's Storm Songs," and several others, which induced a wide interest. He published "Prometheus" in 1773, and the following year wrote "Clavigo" and "Edwin and Elmire." In 1775 Charles Augustus, duke of Saxe-Weimar, pressed Goethe to settle in Weimar, which he did in November of that year. The following year he was appointed privy councillor of legation, and was given a seat and vote in the privy council. Serving for ten years as a public officer and producing numerous works of literary value, he earned a long-desired journey to Italy, and during his two years' residence there visited the principal Italian cities and Sicily. Within this time he revised a number of his former productions, completed "Egmont" and "Iphigenia," and began work on his master-work, "Faust," the first part of which he published in 1808. He likewise turned his attention to the study of botany and optics. In 1790 his botanical work appeared, being devoted to a general discussion of the parts of plants and seed production. His collected writings in optics, entitled "Contributions to Optics," appeared soon after, and about the same time he served as director of the Weimar court theater.

JOHANN VON GOETHE.

Goethe accompanied the duke of Saxe-Weimar on his campaign with a Prussian army against the French, witnessing the battle of Valmy in September, 1792. Soon after his dramatic work first appeared at the Weimar theater, for which he also adapted several productions of Schiller and many of the best selections from other German authors. "Wilhelm Meister's Apprenticeship" was published in 1796. It received a general reading by the people of various countries, being translated into many languages. In 1821 the continuation of this novel was presented at the Wilhelm Meister theater as "Journeyman," a production also of general interest. His famous poetic work, "Hermann and Dorothea," appeared in 1807, and it, like "Tasso," bears the type of the ripe manhood of the author, dealing with characters taken from humble life. The second edition of "Faust" had appeared sometime previously, presenting the several characters in an enlightened form. His work entitled "Theory of Color," a treatise of scientific interest, was published in 1810, but it did not receive general approval among scholars. His "Autobiography" was published in 1814, and embodies many interesting literary and personal recollections. The second part of "Faust" was published in 1831, comprising a production generally classed among the greatest literary masterpieces of the world. Goethe's "Faust" has been credited by scholars as of equal rank with "Job" and "Hamlet," the three being regarded the finest tragedies extant. Personally Goethe was a man of excellent appearance, a writer of deep soul and thought, and likewise was imbued with a profound poetic spirit. His productions not only quickened the thought and feeling of Germanic peoples, but are widely read in the various languages into which they have been translated. While Schiller is a greater favorite with English readers, Goethe is essentially German and occupies a position in German literature quite similar to that retained by Shakespeare among the English writers. Several fine monuments have been erected to his memory.

GOG AND MAGOG, two names mentioned several times in the Scriptures. In Genesis Magog is alluded to as a son of Japhet, and Ezekiel spoke of Gog as prince of Magog, who formed an alliance against Israel. Some writers regard the Persians as descendants from Magog, and the Goths from both Gog and Magog. The names were also applied to two giants of early English history, of whom two statues are in the Guildhall at London.

GOLCONDA (gŏl-kŏn'dą), a ruined city and fortress of India, seven miles west of Hyderabad. Golconda was the capital of the principal kingdom of the Deccan, but was conquered by Aurungzebe in 1687. The fortress now serves as a military post and treasury of Nizam. There are extensive interests in cutting and polishing diamonds, which is the chief employment in the city, diamonds being mined some distance from it, at Partial, on the southeastern boundary of Nizam.

GOLD, a bright-yellow precious metal,

noted for its value, ductility, and malleability. Its specific gravity is nineteen, atomic weight 196, and melting point about 2,282° Fahr. The ductility of gold is so great that a grain can be drawn into a wire 500 feet long, and which quantity is sufficient to gild two miles of silver wire. Its malleability makes it possible for one grain to be beaten out so as to cover fifty-six square inches, when it has a thickness of only $\frac{1}{281960}$ part of an inch. Water and oxygen do not act upon it at any temperature; air does not tarnish it, and it may not be dissolved by hydrochloric, nitric, or sulphuric acid, but is soluble in a mixture of nitric and hydrochloric acids. Gold crystallizes in cubes and other regular forms and yields two series of salts, aurous and auric. It is extracted from the quartz ore by pulverizing, and, after adding a quantity of mercury with some sodium, the amalgam is heated to liberate the mercury; the sulphur and arsenic are set free by highly heating the auriferous pyrites before treating them with the amalgam. Pure gold is twenty-four carats fine, but it is used in the arts to form an alloy for the reason that pure gold is too soft to serve useful purposes. One-fourth of copper and three-fourths of gold form the usual alloy used by jewelers. In gold coinage two parts of copper and twenty-two parts of gold form the standard, making it twenty-two carats fine. The highest degree of fineness commonly used by jewelers is eighteen parts of gold to six of alloy; thus the degree of fineness is eighteen carats. Both gold and silver occur as an alloy in nature, this form of the metal being of a paler yellow than pure gold, while the copper alloy has a more reddish-yellow color. Gold serves a useful purpose in medicine, especially in scrofulous diseases, while dentists use gold-leaf in filling teeth.

Gold has been sought from early historic times. The Bible makes mention of this metal in the second chapter of Genesis. It is found in alluvial deposits, occurring in small particles or nuggets, and is separated by washing in troughs and pans, by which the foreign matter is separated from the gold dust, grains, or nuggets. However, it occurs most numerously in sandstone, slate, quartzite, granite, and serpentine. The most celebrated gold fields are in Australia. Those of California, discovered in 1848, in El Dorado county, brought on the gold fever of 1849. Gold found in Alaska occurs largely as placer deposits, while in many of the extensive mountain regions, as in Colorado, portions of the Pacific coast, and in South Africa, it is found in fissures or contained in quartz veins. The mining is done by vast machinery in the larger mines and the rock crushed, after which the gold is separated from the rock and other ore bodies by excessive heat; natural gas, coal and electricity are employed as agents in smelting. Gold deposits have been found in more or less paying quantities in many of the states and in all the countries of the world, though in some regions the deposits are not sufficiently rich to warrant the application of time and labor. It is estimated that the value of the world's production of gold from 1493 to 1875 equaled $4,645,870,395, and from the latter year to 1890, $1,508,985,000. The present annual production of the world is estimated at $284,218,900. Of this amount North America produces $86,150,000; South America, $12,500,000; Europe, $29,700,000; Asia, $15,500,000; Africa, $79,200,000, and Australasia, $61,168,000. The largest pure gold nugget ever found was taken from the diggings at Ballarat, Australia, shortly after the discovery of the Australian gold fields in 1857. It weighed 130 pounds. California, Colorado, and Montana are the greatest gold producing states. Other very important gold fields are found in the Black Hills, Alaska, Idaho, Oregon, and Nevada.

GOLD COAST, a British colony of West Africa, lying along the Gulf of Guinea. It has a coast line of 345 miles and extends inland 300 miles. The area is 16,500 square miles, but to it belongs a protectorate of 46,600 square miles. There is a total population of 1,500,000, of which only 150 are Europeans. Among the principal towns are Accra, Elmina, and Cape Coast Castle. The first colony was founded in 1821, and in 1900 the controversy regarding the Ashanti more fully established the British claim to the region. Among the chief productions are live-stock, gold, coffee, palm oil, copal, rubber, timber, monkey skins, and cocoa. Several railway lines connect the coast towns with the interior, while numerous canals and highways facilitate trade. The climate is quite unhealthful for Europeans.

GOLDEN AGE, the term applied in mythical history to the early period of many nations. It refers to a time when all animals were supposed to be at peace with each other, the earth produced the fullness of all necessary fruits for comfort, and innocence and happiness were general among mankind. The Egyptians believed that the gods sent successive conflagrations and deluges to purify the earth of guilt, and after these man was pure for a time, but when again degenerated a catastrophe once more came for his destruction. Roman literature was in its golden age from 150 B. C. to 14 A. D., when flourished the great Cicero, Cæsar, Sallust, Ovid, Virgil, and Horace. In English literature the golden age includes the reign of Queen Anne, which period was made famous by the writings of such men as Pope, Addison, and Dryden.

GOLDEN FLEECE, in mythical history, a fleece taken by Phryxus from the golden ram and nailed by Aetes in the Grove of Ares, where it was guarded at the entrance of the grove by an immense dragon that never slept. To secure the fleece Jason made his Argonautic expedition to Colchis, and, while Medea put the dragon to sleep,

he carried the treasure away. The name was applied to an order of knighthood founded in Austria and Spain by Philip III. in 1429, which still survives and continues to be the highest order bestowed in those countries.

GOLDEN GATE, a passage from the Pacific to the Bay of San Francisco, about one mile wide. It separates two peninsulas, and is defended by two forts, one on the inner and the other on the outer side.

GOLDEN-ROD, a genus of plants allied to the aster, including more than one hundred species, most of which are native to America. The stems are rod-like, leaves alternate, and flowers closely bunched and yellow in color. In some communities the leaves are used for tea. Its general distribution has led some states to adopt it as a state flower.

GOLDFINCH, the name of several birds noted for their beautifully variegated colors, mostly yellow, red, black, and white. The

AMERICAN GOLDFINCH.

bill is sharp and the song exceptionally pleasing. There are a number of species, some being favorites as cage birds. They lay four or five purple and brown spotted eggs in nests built of twigs and moss, inlaid with wool, and most frequently in hedges and orchards. The goldfinch is found largely in America, Eurasia, and other grand divisions.

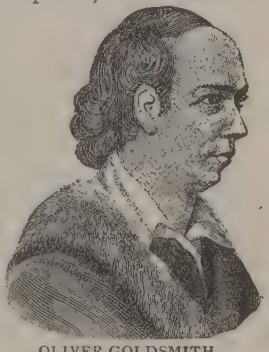
GOLDFISH, a beautiful species of carp largely distributed in the fresh waters of China and Japan, whence it was introduced into Europe in the 17th century. In the native state it is greenish-brown in color, but by artificial breeding and selection a golden-yellow hue has been acquired. At present the goldfish is cultivated extensively, being kept largely in aquariums for ornament. When propagated in large bodies of water, the artificially bred revert to the color of the original stock. The silver fish is a variety of the same class of fishes.

GOLDSBORO, a city of Wayne county, North Carolina, on the Neuse River, forty-seven miles southeast of Raleigh. It is an important railroad center and has good schools and numerous factories. Among the manufactured products are tobacco, cotton-seed oil, furniture, machinery, pottery, and cotton goods. There are waterworks, electric lighting, and several county buildings. The surrounding country is a fertile agricultural region. Population, 1900, 5,877.

GOLDSBOROUGH (gōldz'b'ro), **Louis Malesherbes**, naval officer, born in Washington, D. C., Feb. 18, 1805; died there Feb. 20, 1878. At the age of seven years he entered the navy as midshipman, at twenty became lieutenant, and in 1827 was accorded the thanks of England for rescuing the Comet from Greek pirates. In 1847 he commanded the frigate Ohio at Vera Cruz, and after the Mexican War became superintendent of the United States Naval Academy. He was flag officer of the Minnesota in 1861, became rear-admiral in 1862, and had command of the European squadron in 1865. In 1873 he was placed on the retired list. His services covered a longer period than that of any naval officer of his time, and his duties were discharged efficiently.

GOLDSCHMIDT (gōlt'shmit), **Jenny Lind**. See **Jenny Lind**.

GOLDSMITH, **Oliver**, author and poet, born in Pallas, Longford county, Ireland, Nov. 10, 1728; died April 4, 1774. He was the son of a clergyman of the Established Church, at the age of six years began his school studies in the village, but was interrupted for a time by an attack of smallpox. After attending various elementary schools, he entered Trinity College, Dublin, in 1745, his expenses being defrayed by an uncle, Thomas Contarine. He remained in the institution until securing the degree of bachelor. His uncle desired that he enter the ministry, but, after studying a short time, he was rejected by the bishop. Subsequently he started on a tour to America, but only reached Cork. Soon after he lost in gambling $250, a sum of money given him to study law in London, and later he became a student of medicine at Edinburgh. After pursuing the study of chemistry and natural science for about eighteen months, he started on a tour through France, Switzerland, Germany, and Italy. A degree in medicine was given him at Padua, and he returned to London



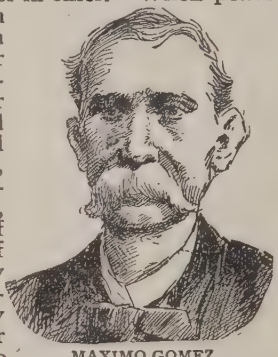
OLIVER GOLDSMITH.

in 1756. After trying in vain to earn a competence by practicing medicine, teaching, and proof-reading, he concluded to adopt a literary career.

The first publication of Goldsmith was a translation of "Memoirs," a work published by Jean Marteilhe of Bergerac, which appeared under an assumed name. Shortly after he conducted departments in the "Monthly Review" and contributed to the "Public Ledger." In 1759 he published "Inquiry into the Present State of Political Learning in Europe," and also contributed to "The Bee" and "The Ladies' Magazine." He met Dr. Johnson for the first time in 1761, and from him drew inspiration, which finally enabled him to come in touch with literary clubs. "The Travelers" appeared in 1764, "Vicar of Wakefield" two years later, and from these he secured good returns by arousing public interest. Other publications include "Good Natured Man;" "Deserted Village;" "Roman History;" "She Stoops to Conquer;" "History of Animated Nature;" "Life of Richard Nash;" "Grecian History;" "History of England;" "Citizen of the World," and "Retaliation." The most popular of his poems are "Travelers" and "Deserted Village," while the "Vicar of Wakefield" is his best novel and is still widely read both in the homes and in schools. Goldsmith possessed the most excellent natural genius characterizing the writers of his time. He produced the best novels, the finest poems, and one of the most excellent comedies of the period. Though his manner was undignified and his traits were rather vain, impulsive, and extravagant, he was able to measure talent with any of his contemporaries. When secluded in his chamber and while by himself he appeared at his best. His works relating to history and nature studies are pleasing and popular, but they do not possess the high value by which his novels and poems are characterized.

GOLIATH (go-lī'ath), the celebrated giant of Gath, whom David slew. According to Josephus and the Septuagint translation of the Bible, he was four cubits and a span, but according to other translations, six cubits and a span. Counting the cubit twenty-one inches, he was about eleven feet tall.

GOMEZ (go'mĕth), **Maximo**, celebrated Cuban patriot, born of Spanish parentage in Bani, San Domingo, in 1838. He served in the Spanish army during the revolt in San Domingo, and accompanied the imperial troops to Cuba. While in the latter island he became displeased with Spanish cruelty and withdrew from the military service. He joined the insurgents at the outbreak of the Ten Years' War in 1868, and received an important command under the Cuban president. During this war he aided in the capture of Bayamo, Tunas, Santa Cruz and Cascorro, and took part in the battles of Las Guasimas and Palo Sico. Later he invaded Santa Clara, was promoted to the rank of major-general for distinguished services, and soon after became commander-in-chief. When peace was concluded in 1878, he settled in Jamaica and later went to San Domingo. At the latter place he engaged in agriculture until sent for by Marti, the Cuban revolutionary president, at the beginning of the revolution of 1895. His military skill and extraordinary bravery made it possible for the Cuban army to engage the Spaniards until the intervention by the United States in 1898. Gomez, Antonio Maceo, and Calixto Garcia were the three leaders of greatest eminence in the last revolution.



MAXIMO GOMEZ.

GOMPERS, Samuel, American economist, born in London, England, in 1854. His elementary education was received at night schools, while working during the day as a shoemaker and later as a cigarmaker. In 1867 he came to the United States, and soon after joined the International Cigarmakers' Union. His ability as a labor leader caused him to be elected to various offices, and lastly to the presidency of the organization. In 1894 he founded the "American Federationist," a monthly journal devoted to the discussion of the labor question. He gave much time to the study of labor associations, thorough organization, and advocated shorter hours for workingmen. As a lecturer he exercised a wide range of influence, advocating among other things a graduated income tax, the arbitration of differences between employers and employees, and a curtailment and abolition of trusts. He contributed much of value to the movement for an enlargement of municipal improvement through public ownership.

GONDOLA (gŏn'dō-là), a class of barges used at Venice to navigate the canals. A gondola of medium size is rowed by one man, has seats amidship, and is about thirty feet long and four wide. The ends terminate with pointed projections about six feet high. Usually the larger sizes are rowed by two men, one at either end, each using a single oar.

GONG (gŏng), a musical instrument shaped like a tambourine, made of copper alloy, and struck by a padded drumstick. It gives out a combination of harmonies, serving to produce signals and to add intensity to martial music.

GONSALVO de CORDOVA (gon-säl'vo dā kor'do-vä), celebrated warrior, called the Great Captain, born in Montilla, near Cordova, Spain, March 16, 1453; died in Granada, Dec. 2, 1515. He first distin-

guished himself in 1475 during the war between Spain and Portugal; later he served with distinction against the Moors, and continued aggressive until Granada was conquered in 1492. Three years later he joined Ferdinand II., king of Naples, against the French, and succeeded in expelling the latter from Italy. In 1498 he returned to Spain, was made duke of San Angelo, and again proceeded to Italy, where he gained several victories over the Turks and French. The jealousy of the king caused his recall, and he was deprived of the viceroyalty of Naples, to which office he had been promoted. Shortly after he settled in Granada, remaining there until his death.

GOODE, George Brown, ichthyologist, born in New Albany, Indiana, Feb. 13, 1851; died in Washington, D. C., Sept. 6, 1896. After graduating at Wesleyan University in 1870, he became teacher of natural history at that institution, and in 1873 received an appointment on the staff of the Smithsonian Institution. In 1876 he was director of the natural history division of the United States government at the Centennial Exhibition. He was United States fish commissioner at expositions held in Berlin, London, New Orleans, Chicago, Atlanta, and several other cities. In 1887 he succeeded S. F. Baird as fish commissioner of the United States. Among his works of value are "American Fisheries;" "Game Fishes in the United States;" "Natural History of the Bermudas," and "Oceanic Ichthyology."

GOOD FRIDAY, the fast kept in memory of the crucifixion of Christ, on the Friday before Easter. Nearly all the Protestant and Catholic churches observe the feast with much solemnity. It is named "good" because of the beneficent effect that comes from keeping the day, and during its observance special prayers are included for all classes of people.

GOODRICH, Samuel Griswold, author, born in Ridgefield, Conn., Aug. 19, 1793; died May 9, 1860. He is best known by the pseudonym, "Peter Parley." His productions and compilations include about 170 books for children and youths, besides a number of others for adult readers. He was consul in Paris during President Fillmore's administration, in 1851-55, and while there published a work in French, in which he reviewed the geography and history of America. Among his productions are "History of All Nations;" "Recollections of a Lifetime;" "Sketches from a Student's Window," and "Outcast and Other Poems."

GOOD TEMPLARS, Independent Order of, a total abstinence society organized in New York City in 1851. In 1859 it adopted a platform of absolute prohibition, no license, and total abstinence. It organized branch lodges in Europe in 1868, and in 1870 established a grand lodge in England. Both sexes are admitted and adults and juvenile members are recognized, though in different branches. There are fifty official periodicals in different languages. At present branch organizatons are maintained in all parts of the civilized world. The membership in the main organization is 410,850, and in the juvenile branch 181,382.

GOODWIN SANDS, a stretch of shifting sandbanks off the coast of Kent, England. It is dangerous to navigation and has been the cause of many noted shipwrecks.

GOODYEAR (gŏŏd'yur), **Charles,** inventor, born in New Haven, Conn., Dec. 29, 1800; died in New York City, July 1, 1860. He became a member of the firm of A. Goodyear & Sons when twenty-one years of age, engaging extensively in the manufacture of steel machinery, but in 1830 the company was compelled to suspend business on account of financial failures. Soon after he began to experiment in making india-rubber. He discovered that a preserving effect is secured by applying nitric acid on rubber, but later he used sulphur for the same purpose, and in 1844 was granted a patent on vulcanized rubber. The rubber industry rapidly rose into prominence. Before his death there were about 500 uses for the product, and about 65,000 persons were employed in its production in the leading manufacturing countries of the world. In 1851 he received medals at the exhibition at London, and in 1855 at the Paris exposition. Napoleon III. awarded him the cross of the Legion of Honor, and other distinctions were accorded him on account of his valuable services to mankind.

GOOSE (gōōs), a web-footed bird of the duck family. In all species the body is large and heavy, bill conical, and upper

WILD GOOSE.

mandible slightly hooked. The head is small, neck long, wings powerful, and toes short. Geese are migratory and move from the polar regions toward the warmer zones on the approach of winter. They swim less than ducks, and do not dive, but commonly

search for food by submerging the head under water. The domestic goose is thought to have originated from the Anser ferus, the typical genus of the sub-family anserinæ. There are many varieties, all of which are valuable for their flesh, eggs, and feathers. Most of the wild species are gray in color, and the domestic largely white. An average-sized goose is two feet ten inches long, the extended wings measuring five feet in expanse. Among the varieties wild or reared in America are the snow goose, white-front goose, bean goose, Canada goose, China goose, Toulouse goose, gray-leg goose, and cravat goose. The Canada goose is the most widely distributed wild species in North America. Several of the species are noted for their longevity. There are instances on record showing that they live to an age of eighty years. The male is commonly called gander.

GOOSEBERRY (gōōz'bĕr-rў), a class of shrubs allied to currants, but differing from them in having thorny stems. They grow

GOOSEBERRY.

wild in North America and Eurasia, but have been greatly improved by cultivation. The leaves are three-lobed, flowers unimportant, and berries succulent and variously colored when ripe, as green, yellow, whitish, and red. Plants four years old bear the best quality of fruit. The berries are eaten as a dessert and form a favorite material for jelly, pie, vinegar, and preserves. New plants may be propagated from the seeds or from slips.

GOPHER (gō'fẽr), a class of burrowing animals native to North America. The name was first applied by the French to the varieties that honeycomb the ground by burrowing. Among the common species are the gray burrowing squirrel, the striped squirrel, and the pocket gopher. All these are mammals. The pocket or pouched gopher has peculiar pouches on the sides of the head, which facilitate piling up mounds in fields and meadows. Gophers are destructive to corn in the early stages of growth.

GORDIAN KNOT (gôr'dĭ-*a*n nŏt), a knot bound by Gordius in tying the yoke of his chariot. This was done so intricately that the oracle of Delphi promised the empire of Asia to him who would untie it. When Alexander the Great arrived at Gordium, he wished to inspire his soldiers with courage and spread the belief among his enemies that he was destined to conquer. Accordingly, he cut the knot with his sword and claimed that he had fulfilled the oracle. To "cut the gordian knot" has since implied the removal of a difficulty by bold means.

GORDON (gôr'dǫn), **Charles George,** soldier, known also as Chinese Gordon and Gordon Pasha, born in Woolwich, England, Jan. 23, 1833; died at Khartoum, Africa, Jan. 28, 1885. He descended from a family of soldiers, being the fourth son of General Gordon, and studied at the military academy of his native town. He and two brothers entered the army. In 1852 he was granted a commission in the royal engineers; his first work was to aid in planning fortifications at Milford Haven. In 1854 he was engaged in the Crimea, and there exhibited the fearless fatalism by which his entire life was made serviceable to his country He was ordered to China in 1860, where he witnessed the attack on the Summer Palace at Pekin, and secured a prize of $250 for his services. The general command of the Chinese forces was given him in 1863, in which capacity he led several successive campaigns, fighting thirty-three battles, and succeeded in suppressing the Taiping rebellion. Though but thirty years of age, he was brevetted major, and attained successes that spread his renown to all countries. In 1863 he returned to England, where he pursued the ordinary duties of engineer at Gravesend till 1872, and next proceeded as commissioner to Bulgaria.

Khedive Ismail of Egypt employed him to survey the region of the Nile near the equatorial provinces, in which capacity he established fortified posts and suppressed the slave trade, and on account of valuable services was made pasha. Khedive Tewfik failed to give him support in his operations, and he accordingly resigned his position and returned to England in 1880, where he was greeted with marked enthusiasm. Soon after he was appointed to command the royal engineers in Mauritius Island, where he became major-general and held command of the British troops till 1882. The Moslem population having risen in Soudan and defeated the Egyptians, Gordon was sent for the purpose of bringing the insurrectionists to terms. He left London in the early part of 1884 to proceed to Khartoum, and was accorded remarkable confidence by the officials of England. Reaching Cairo, he proceeded at once to Khartoum, where he was received with joy, and by well directed efforts established order in that region. Soon after the Mahdi raised a large army,

surrounded Khartoum, and laid a prolonged siege to that place. Gordon and his companions battled with marked bravery in defense of the city, but on Jan. 28, 1885, the Mahdi captured the place and promptly executed Gordon. Two days later a British army reached the city, but it came too late to save the commander. Gordon ranked with Cromwell and exhibited the bravery of a Crusader. His devotion to fatalism made him daring and brave, while his excellent judgment and kindness of disposition secured for him the confidence of his soldiers. The story of his heroic life reads like a fairy tale, but embodies only the achievements of a great man. Among his publications are "Letters from the Crimea;" "Letters to his Sister;" "Gordon at Khartoum;" "Exploits in China," and "Reflections in Palestine."

GORDON, John Brown, soldier and statesman, born in Upson county, Georgia, Feb. 6, 1832. His education was secured at the University of Georgia. He served in the Confederate army, rose rapidly to the rank of major-general, and rendered efficient service in numerous battles. He attended the national democratic conventions of 1868 and 1872, and in the latter year was elected to succeed Joshua Hill as United States senator. In 1886-90 he was governor of Georgia, elected to fill a vacancy in the senate in 1890, and re-elected in 1891. Gordon attained a wide reputation as a lecturer, and was in popular demand in all parts of the country. He died Jan. 9, 1904.

GORE (gōr), **Christopher,** jurist and statesman, born in Boston, Mass., Sept. 21, 1758; died March 1, 1827. After graduating from Harvard in 1776, he practiced law in Boston, and from 1789 to 1796 was United States district attorney for Massachusetts. In 1796 he served as commissioner with William Pinckney to settle claims against France, and remained in England for seven years. He returned to the United States in 1804, was elected governor of Massachusetts in 1809, and became a United States senator in 1814. Several colleges were remembered by donations, the principal gift being $100,000 to Harvard College. A library building was named Gore Hall in his honor.

GORGONS (gôr'gŏnz), the name of three Grecian goddesses, known respectively as Euryale, Stheno, and Medusa. They were frightful in appearance. Their heads were entwined with serpents, the bodies covered with scales, and from their mouths projected tusks like those of wild boars. The teeth were of brass, and they had long claws instead of hands. Those who ventured to look upon them turned to stone, but Perseus relieved humanity by slaying them, and the head of Medusa was placed in Minerva's shield.

GORILLA (gŏ-rĭl'lă), the name applied as early as the 5th century B. C. to the largest animal of the ape family, native to western Africa. An adult gorilla is from five to six feet tall when standing erect. It has black hair on the back, reddish-brown to black on its belly, and subsists on vegetables and

GORILLAS.

fruits. The gorilla is allied to the chimpanzee, but is larger. Its number of teeth, height, bones in the hand, ribs, and brain structure correspond exactly to the same organs in man, though the brain measures only from twenty-three to thirty-five cubic inches, while in man it measures from sixty-two to 114 cubic inches. In physical strength the gorilla is powerful, being the strongest of the anthropoid apes. The voice resembles a bark, though it is like a roar when the animal becomes enraged. Gorillas live in families and build hammocks in trees as places to sleep and rest.

GORMAN, Arthur Pue, statesman, born in Howard county, Maryland, March 11, 1839. After securing a public school education, he became a page in the United States senate, in which position he served from 1852 to 1866. In 1869 he was appointed collector of internal revenue for Maryland, and in 1872 was made president of the Chesapeake and Ohio Canal Company, serving in that capacity about twenty years. He was a member of the Maryland house of representatives in 1869-75, state senator in 1875-81, and United States senator in 1881-99. Gorman exercised much influence in the legislation of his state as well as in the national government. He supported the democratic party, and was an efficient leader in favor of civil service reform and questions of international commerce.

GORTSCHAKOFF (gôrt-chä-kof'), **Prince Alexandra Michaelovitch,** statesman, born in St. Petersburg, Russia, July 16, 1798; died in Baden-Baden, Germany, March 11, 1883. After being educated at the Lyceum of Zarskœ-Selo, he entered the diplomatic service in 1824, served as ambassador at Vienna in 1854-56, and was then appointed minister of foreign affairs. In 1863 he became chancellor of the empire, and was the most influential minister of Europe until the ascendancy of Bismarck. During the Franco-German War, in 1870-71, he was

friendly to German policies, and took occasion to announce Russia's determination not to be restricted in the navigation right of the Black Sea. This demand was consented to by a conference in 1871. In 1878 he participated in the Berlin conference, and in 1882 retired from public life and settled in Baden-Baden. To his able diplomacy the recent development of Russian commerce is largely indebted.

GOSCHEN (go'shen), **George Joachim**, statesman, born in London, England, Aug. 10, 1831. He descended from a German family. After studying at Oxford, he engaged in mercantile business in 1853, and ten years later was elected as a liberal to parliament, serving on many important committees until he withdrew in 1878. In 1883 he was sent as commissioner to treat with the sultan at Constantinople, and in 1887 succeeded Lord Churchill as chancellor of the exchequer in the Salisbury ministry. He became a member of Lord Salisbury's cabinet in 1895, and was made lord of the admiralty. The profound scholarship and wisdom manifested in public life led to his selection as lord rector of Aberdeen University in 1888. He published "Theory of Foreign Exchange."

GOSHEN, a city in Indiana, county seat of Elkhart county, on several trunk railway lines, midway between Chicago and Toledo. An abundance of water-power is secured from the Elkhart River, which has facilitated building up many manufacturing establishments. Among the manufactured products are wagons, plows, flour, oil, woolen goods, machinery, and cigars. Its lumber, grain, and fruit trade is extensive. The city possesses regularly platted streets, excellent schools, many fine churches, and is noted for its thrift and enterprise. There are gas and electric lights, waterworks, pavements, and a fine courthouse. Population, 1900, 7,810.

GOSNOLD (gos'nold), **Bartholomew**, navigator, born in England about 1550; died in Virginia, Aug. 22, 1607. He became connected with Sir Walter Raleigh in the enterprise of founding a colony in Virginia, and sailed from Falmouth in 1602 with a ship and twenty colonists. After a voyage of seven weeks he reached the coast of Maine, and, passing southward, discovered Cape Cod. After spending a severe winter, the colonists returned to England, but he sailed to America again in 1606 with three small ships and about one hundred colonists. It was this expedition that founded the first permanent settlement in America, at Jamestown, on the James River, in 1607.

GOSSAMER (gŏs'sa-mēr), a term applied by German and French writers to the flake-like webs seen floating in the air on calm autumn days. They are composed of silk emitted by many species of immature spiders. Being lighter than the atmosphere, they float in the gentle breezes. The threads are spun to connect different blades and plants, and, by reason of the loosening effect resulting from autumnal breezes and the shrinking of plants, the gossamer becomes detached and is carried to various heights and frequently long distances. Gossamer is a term also applied to a light waterproof cloak worn by ladies.

GOSSE (gŏss), **Philip Henry**, naturalist, born in Worcester, England, April 10, 1810; died Aug. 23, 1888. He came to America in 1827, engaging as mercantile clerk in Newfoundland. Later he became a farmer in Canada, taught school in Alabama, and studied as a naturalist in Jamaica. In 1840 he returned to England, where he published "Canadian Naturalist." Later he published other works, among them "History of the Jews;" "Birds, Reptiles, and Fishes;" "Land and Sea," and "Great Atlas Moth of Asia." His son, Edmund William Gosse, born in London, Sept. 21, 1849, is the author of several valuable works. Among his productions are "Studies in Northern Literature;" "From Shakespeare to Pope;" "The Jacobean Poets," and "History of Eighteenth Century Literature."

GOTHIC ARCHITECTURE (gŏth'ĭk), the name used to designate the style of architecture characterized by the pointed arch. In a wider sense it includes the forms introduced by the barbaric tribes that overthrew Rome, and largely prevailed in Europe from the 6th to the 16th century, though in a newer classification it dates only from the 11th century, when it took on an improved form. The term is generally used in history to distinguish the Gothic from the classic architecture, and also from the transition styles introduced by the Norman-Franks. Besides the pointed arches, it is marked by a prolongation of vertical lines; absence of square edges; want of columns and rectangular surfaces, and the general substitution of various surfaces, grouped shafts, and a multiplication of different ornamental forms. Excessive decoration of the perpendicular lines and ornamentation of the horizontal by starring caused the Gothic to lose favor, but it is now reviving somewhat. Many of the most noted historic buildings of Germany, Spain, France, England, Scandinavia, and other countries of Eurasia are in the Gothic style. The two principal forms of the Gothic architecture are known as the perpendicular and decorated. The former originated in Germany and the latter in England.

GOTHS (gŏths), an ancient race of German people who occupied a large portion of Europe and Asiatic Russia. In the early part of the 3d century they inhabited the country north of the Black Sea, and by numerous conquests came into possession of much territory and powerful military forces. The tribes occupying the regions farthest east were known as Ostrogoths, those farthest west as Visigoths, and a branch of the

latter that settled in Bulgaria were known as Moesogoths. Before their division into the eastern and western branches, their king, Filmer, led an army and occupied Euxine, from which region the different historical branches sprang. War was waged by their king, Ostrogotha, against the Romans in 248, and extensive contests were conducted in the eastern provinces of Rome for eighteen years, but subsequently Claudius defeated them. Emperor Aurelian was compelled to cede the province of Dacia to them, where the Visigoths formed their chief settlement, while the Ostrogoths remained in southeastern Russia. The kingdom under Ermanaric attained much power, and included the region from the Gulf of Bothnia to the Black Sea, extending far toward the east. Internal disputes caused a division in the year 369, after which the Visigoths formed a separate kingdom west of the Danube, and the Ostrogoths east of that river. Alaric, king of the Visigoths, invaded Greece in 396, conquered the Peloponnesus, and obtained the government of Illyria. He invaded Italy in 409-10, captured Rome, and carried away much of the riches of that city. In 410 Alaric died, and shortly after the Visigoths invaded Spain and Gaul. In the 5th century they established the seat of their government at Toulouse, their principal provinces being Languedoc, Provence, and Catalonia. The Visigoths were finally vanquished by the Moors, who crossed into Spain from Africa, and for many years constituted the principal factor in the Iberian Peninsula. Roderick, who died in 711, was the last king of the Visigoths.

The kingdom of the Ostrogoths was overthrown by the Huns in 375, after which they largely followed a nomadic life. At the time Attila, the Hun, invaded Gaul he was supported by a vast horde of Ostrogothic warriors, and, when the empire of the Huns came to an end, they settled near Vienna, and later in Moesia, now called Bulgaria, from which they became known as Moesogoths. The Ostrogoths attained vast military power under Theodoric. This ruler was educated at Constantinople as a Roman nobleman, and in 474 was made king by the Ostrogoths. Odoacer the Usurper conquered the western empire in 476. In 489 Theodoric invaded Italy with a vast army, and four years later was recognized king. He reigned successfully until his death in 526, and in 554 the kingdom came to an end. During its greatest prosperity the Ostrogothic kingdom included Italy and large portions of Switzerland, Hungary, Austria and Roumania. Subsequently the Gothic people lost their identity as a nation and became assimilated by other peoples.

The German, English, and Scandinavian languages may be traced to the Gothic tongue; the first two to the Visigothic and the last to the Ostrogothic. A translation of the Bible into Gothic was made by Bishop Wulfila, a man of profound learning, about 375. Several portions of this work are extant, also a number of explanations of the gospels. The language attained its highest literary culture during the occupation of Italy, though it did not long survive the Gothic peoples. A number of remains and the Bible translation are of great value in studying the growth and history of the early Germanic languages.

GOTHARD, St., a mountain group in Switzerland, belonging to the Helvetian Alps, and famous for the St. Gothard pass over the Alps. The highest peak of this mountain group is about 12,000 feet, and the point at which the St. Gothard Hospice stands is 16,810 feet. A carriage pass across the Alps was completed in 1832. One of the most important railroad tunnels in the world, known as St. Gothard's, passes through the mountains between Ariolo on the south and Goschenen on the north, and by it the railroad systems of Italy, Switzerland, and Germany are connected. The tunnel was commenced in 1872 and opened for traffic in 1882. It is nine and one-half miles long, and cost about $12,000,000.

GOTHLAND (gŏt'land), an island in the Baltic Sea, about fifty-two miles east of Sweden. It has a rocky coast, but much of the soil is fertile. Its elevation is about 250 feet above sea-level; area, 1,210 square miles. There are several good harbors. The larger cities are connected by railway and carry on an important trade in cereals and fish. Wishy is the chief city, having a population of 7,645. The population of the island is 54,392.

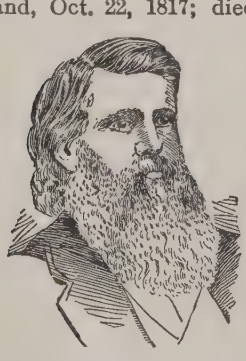
GOTTENBURG (gŏt'ẹn-bûrg), an important seaport of Sweden, in Swedish called Göteborg. It is situated on the Cattegat, about twenty-five miles southwest of Stockholm, and has an excellent harbor and extensive canal and railroad connections. The city ranks among the best built cities of Sweden, having extensive shipbuilding yards, excellent institutions of learning, and important factories. Among the products are included cotton and woolen goods, sail cloth, spirituous beverages, machinery, sugar, tobacco, paper, glass, and furniture. It is important for its exports of fish, iron, copper, tar, pitch, and lumber. There are imports of cereals, food products, and salt. Since 1865 a successful system of municipal regulation has been in force, by means of which companies are licensed for the management of public houses, and, after retaining six per cent. as profit on the capital invested, they turn the balance over to the city. There is an excellent public library, business exchange, cathedral, societies for the promotion of science and literature, and several institutions to promulgate higher learning. Its city government is efficient. The streets and parks are kept in an excellent condition, and the moral status is of a high order as com-

pared to other European cities. Population, 112,175.

GOTTINGEN (göt'ting-ĕn), an important city of Germany, in the province of Hanover, on the Leine River, about fifty-eight miles south of Hanover. There are connections by several railroads, a fine school system, and a hospital. However, it is famous chiefly as the seat of the celebrated Göttingen University, which was founded in 1734 by George II., king of England and elector of Hanover, and formally opened in 1737. The university contains an observatory, a museum, splendid botanical gardens, anatomical collections, and a library with 515,000 volumes and 6,000 manuscripts. There are 125 professors, 1,350 students, and an alumni that includes many of the eminent German masters, among them Blumenbach, Gieseler, Gauss, Herbart, Müller, the Grimm brothers, and Weber. Among the illustrious Americans who studied there are Longfellow and Bancroft. The city is supplied with all municipal facilities, and is engaged in the manufacture of woolen and cotton goods, scientific instruments, chemicals, and musical instruments. Population, 25,650.

GOTTSCHALK (got'shälk), **Louis Moreau,** pianist and composer, born in New Orleans, Louisiana, May 8, 1829; died in Rio Janeiro, Brazil, Dec. 18, 1869. He studied at Paris and in 1848 appeared there in public concerts with much success. Subsequently he traveled in Spain, Germany, and Switzerland, and returned to the United States in 1853. After meeting with an enthusiastic reception at Boston, he appeared in the large cities of the United States, Mexico, West Indies, and Brazil, his death occurring while filling an engagement at Rio Janeiro.

GOUGH (gof), **John Bartholomew,** temperance orator, born in Sandhurst, England, Oct. 22, 1817; died in Philadelphia, Penn., Feb. 18, 1886. He settled in the United States shortly after the death of his father, in 1829, worked on a farm in Oneida county, New York, and in 1831 became a bookbinder in New York City. His early habits were very irregular, but he reformed and devoted himself with much zeal to the temperance cause. In 1853 he visited England and spent two years lecturing in Britain. Among his publications are "Temperance Lectures;" "Autobiography," and "Sunlight and Shadow."



JOHN B. GOUGH.

GOULD (gōōld), **Benjamin Apthorp,** astronomer and statistician, born in Boston, Mass., Sept. 27, 1824; died Nov. 27, 1896. He graduated at Harvard in 1844, from Göttingen, Germany, in 1848, and spent some time in general research, traveling in continental Europe. On his return to America, in 1848, he published the "Astronomical Journal." In 1851 he took charge of the United States coast survey, and discovered a connecting series of measures in longitude from New Orleans to the Ural Mountains. From 1856 to 1859 he superintended the Dudley Observatory in Albany, New York, and in 1868-85 had charge of the National Observatory at Cordova, Argentine Republic, where he made precise photographs of important southern constellations. In 1885 he returned to the United States and resumed the publication of his "Journal," in which many interesting reports appeared. His astronomical observations extended to 73,165 stars. His death occurred in Cambridge, Mass., from falling accidentally. Among his published works are "Zone Catalogue;" "Statistics of American Soldiers," and "Trans-Atlantic Longitude."

GOULD, Jay, financier, born in Roxbury, New York, in May, 1836; died Dec. 2, 1892. Besides attending the village school, he studied a few months at the academy in Hobart, New York, and began his life work as a surveyor. In 1856 he engaged in the tanning and lumber business, became associated with James Fisk, Jr., and engaged in the purchase of railroad bonds in New York City in 1859. Later he was chosen president of the Erie Railway Company, invested largely in stock of other railways, and secured interests in telegraph companies. In 1881 he aided in promoting the elevated railroad system of New York City. It was estimated in 1887 that he controlled over 13,000 miles of railroad, or about one-third of the entire mileage then in the United States. He was remarkable as a financier in that he began without means and at the time of his death possessed an estate valued at $70,000,000.

GOUNOD (goo-no'), **Charles Francois,** operatic composer, born in Paris, France, June 17, 1818; died Oct. 18, 1893. He studied at the Paris Conservatory, and later completed his musical training in Rome, giving special attention to sacred music. On returning to Paris in 1843 he was elected director of music at the Catholic Foreign Mission, and soon after published numerous musical productions. Among the composers of the 19th century he holds high rank. His productions include "Gounod's Sappho;" "Romeo and Juliet;" "Redemption;" "Gounod's Faust;" "Gallia," and the cantata "Ferdinand." In 1866 he became a member of the French Institute and was granted a badge of the Legion of Honor.

GOURD (gōrd), a plant related to the cucumber, having large yellow flowers, ovate or oblong fruit, trailing stems, and hairy leaves. Many varieties have been produced

by propagation, some of which are edible, and others yield a tough outer shell useful for bottles, dippers, and other household vessels. Several varieties are native to Astrakhan and the East and West Indies, but many species are cultivated in America

GOURDS.

and Europe. The gourd family includes the watermelon, muskmelon, squash, cucumber, pumpkin, and musk gourd. Many members of this family of plants have been highly improved by cultivation. They furnish valuable food for man and cattle and form important articles of commerce.

GOUT, a constitutional disorder arising from an excess of uric acid in the blood, caused by an impaired condition of the kidneys. It arises from excessive indulgence in wines, fermented beverages, inactivity, and by partaking of undue quantities of nitrogenous foods. However, it is also inherited, but seldom appears before the age of thirty, and most frequently in the male sex. It is characterized by pains in the joints, but more commonly affects the great toe. Gout affecting the internal organs is most dangerous. The best preventives are regular habits, proper diet, and abstinence from alcoholic drinks.

GOVAN (gŏv'ăn), an important city of Lanark county, Scotland, on the Clyde River, immediately west of Glasgow, of which it is a suburb. It contains extensive manufactures and has important shipbuilding yards. Population, 61,285.

GOVERNMENT (gŭv'ĕrn-mĕnt), that power or influence which is exercised by one person or thing over others. The mainspring of a watch, gravitation, the parental head of a family, and civil officers are agencies that govern in their respective spheres of influence. The term is applied most commonly to the power exercised by recognized officers in a state or nation. Government is an essential element in civilization, indeed, without it citizens would be unprotected in their personal safety and security of property against the attacks of lawless vandals and marauders. Thus, the term government implies the organized means of a state or nation maintained to vouchsafe protection to the industrial, political, social, and moral rights of the people, and for perpetuating its own existence. Governments vary in their form; the most ignorant and barbarous people being governed by tyrants and despots, while the more intelligent and law-abiding are governed under a system in which each individual has certain recognized rights to be protected, and certain powers which he may exercise in promoting and enforcing the laws. The principal forms of government known in history are patriarchal, theocratical, monarchial, aristocratic, democratic, and republican. In general the patriarchal is the family government and existed as the first and oldest. The father is the recognized head of the family, and exercises an influence in shaping the welfare of the household. Though patriarchal governments do not exist at present, yet the family government is the true basis of national security and intelligence. In a theocratic form of government the people are governed as were the Israelites, by the immediate direction and administration of God.

In a monarchial government a monarch is the supreme ruler, and bears the title of king, emperor, czar, sultan, pasha, or some other term implying sovereignty. Monarchies are limited when the power of the sovereign is restricted by a constitution and established laws, but absolute when unlimited power is vested in the chief ruler, and he is responsible to no earthly tribunal. China, Russia, Morocco, and Persia are absolute monarchies, while Germany, England, Italy, Austria, and Spain are limited. A hereditary monarchy is one in which the sovereign inherits the title to the throne, and in an elective monarchy the sovereign owes his position to an election by the people. In an aristocratic government the supreme power is vested in a few men of wealth, usually comprising the clergy and a titled nobility, though both these classes are not uncommon in monarchial governments. A democratic government is one in which the people exercise absolute power, and not only have a voice in making the laws, but in seeing that they are enforced. A republican government is representative. In it the people authorize officers to serve them in making and enforcing the laws. The government of the United States is sometimes called a democratic-republican government for the reason that the people may direct their law-makers to some extent and are represented by them in making laws, while by public approval or disapproval they may induce the officers chosen to administer the laws wisely and justly.

There are three branches in every well established government—the executive, legislative, and judicial. Executive power in the United States government is vested in the president, who is advised in his duties by nine cabinet officers. The cabinet officers are appointed by the

president with the consent of the senate. Legislative power is vested in a congress, which contains two branches—the senate and house of representatives. The senate is composed of two members from each state, who hold office for six years. Members of the house of representatives, who are elected by a popular vote in the states, or in various congressional districts of each state, hold office for two years. The judicial department, consisting of a system of federal courts, culminates in a supreme court, which is composed of a chief justice and eight associate justices. These are appointed by the president with the consent of the senate and hold office during good behavior. Each state has a local government modeled after the essential features of the general government, and which the constitution of the United States guarantees to maintain. The executive officer of the state is the governor; the legislative power is vested in the general assembly, and the judicial in a supreme court having jurisdiction within the particular state. Among the principal resources of the general government are customs duties, internal revenue taxes, proceeds of the sale of public lands, and its ability to borrow money. The required amount of revenue is devoted to the general expenses of the government, and all surplus revenue is expended for the gradual reduction of the public debt or for constructing internal and general improvements.

GOVERNOR (gŭv'ĕrn-ĕr), a mechanical device serving to regulate the admission of steam to an engine according to the rate of velocity. It is formed of a vertical shaft, on which two balls are suspended, and, when the shaft revolves, the balls swing outward. The centrifugal force increases with the rate of velocity at which the shaft rotates, hence the balls are caused to swing farther from the axis of rotation. The object is to secure the uniform velocity of the engine, which is done by this arrangement, since the admission of steam is restricted by a valve as the balls swing outward, but more freely admitted when they swing nearer to the axis of rotation. A similar contrivance is utilized in mills to equalize the motion of machinery. In high-class motors the ball-governor is being displaced rapidly by the inertia governor. This invention overcomes the objection that a ball-governor does not act on the valve until the speed is increased. The inertia governor consists of weights and springs, is set in the fly-wheel of the engine or motor, and acts by its inertia. When there is a tendency of the speed to increase, the inertia of the weights acts in opposition to this tendency, affects the eccentrics, and through them the valves. By means of this device it is possible to check a tendency to increase speed in less than one revolution of the fly-wheel. There are also governors to regulate the inflow of gas and water, each class being used for various purposes.

GOVERNOR'S ISLAND, an island in New York Bay. It has an area of sixty-five acres, and since the War of 1812 has been occupied by the war department. Besides containing a number of forts, it is headquarters for the department of the east, and includes a military museum in which are a number of interesting relics, among them the horse ridden by Sheridan from Winchester, which has been substantially mounted.

GRACCHUS (grak'us), a celebrated historical family of Rome, of which two members became specially distinguished as soldiers and statesmen. Tiberius Sempronius Gracchus, born about 168 B. C., accompanied his brother-in-law, Scipio Africanus, to Africa, and in 137 served in Spain as quæstor to Mancinus. He was elected consul in 133, and by his skill secured a re-enactment of the agrarian law of Licinius Stolo, besides reducing military service and effecting other reforms. He was violently opposed by the aristocratic party in the ensuing election, and, after being defeated, this public benefactor was cruelly slain along with many of his friends.

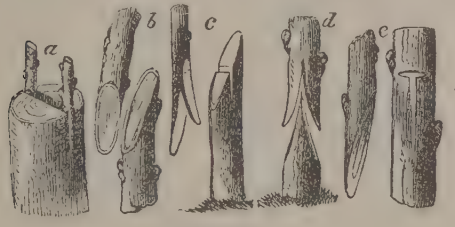
Caius Sempronius Gracchus was a brother of the former. He was born about 159 B. C., and served in Spain under Scipio Africanus at the time of his brother's death. After the first burst of opposition to him had subsided, he returned to Rome and was elected a tribune in 123. He was re-elected the following year, but failed when a candidate the third time. His aim was to better the condition of the poor and to re-establish the agrarian law, thus receiving the plaudits of the common people. After his failure to return as tribune, these reforms were rapidly repealed by the aristocratic party and soon his life became endangered. More than 3,000 of his supporters were slain, but he escaped to the groves of the Furies with a slave, who, after killing his master, committed suicide. It was not long until the people discovered the error in forsaking their friend and made tardy amends by erecting statues and worshiping the Gracchi as deities. It is related of Cornelia, mother of the Gracchi, that, when a friend asked to see her jewels, she pointed to her two sons and remarked, "These are my jewels."

GRACES, the name applied by the Greeks to the three daughters of Zeus and Eurynome, who personified all those gentler attributes which beautify and refine human existence. The individual names of the three sisters were Euphrosyne, Aglaia, and Thalia. They portrayed every gentle emotion of the human heart, such as friendship, modesty, gentleness, purity of mind, and eternal youth. Elaborate works of art and poetry were dedicated to the Graces, while in statuary they are seen in each other's embrace, or stand with their hands linked to signify their virtues.

GRADY, Henry Woodon, journalist, born in Athens, Georgia, in 1851; died Dec.

23, 1889. He graduated at the State University of Georgia, took a course at the University of Virginia, and became a southern correspondent for the "New York Herald." Subsequently he edited the "Rome Daily Commercial," later the "Atlanta Herald," and in 1882 became managing editor of the "Atlanta Constitution," which position he held until his death. His remarkable ability as an orator gave him much popularity. The best of his orations were "New South" and "Future of the Negro." A public hospital and a handsome monument were erected in his honor at Atlanta.

GRAFTING (grăft'ĭng), the process of inserting a scion or bud, taken from a vigorous tree or shrub, into a closely allied species



GRAFTING.
a, cleft grafting; *b*, splice grafting; *c*, tongue grafting; *d*, saddle grafting; *e*, side grafting.

so as to cause them to unite organically and enable the graft to receive greater nutritive power than it could otherwise obtain. Among the advantages of grafting are the rapid multiplication of species, the preservation of varieties that could not be obtained from seed, and the cultivation of tendencies to bear fruit several years earlier than is otherwise possible. The fruit borne by the graft does not partake of the identical kind common to the stock, but preserves its own peculiarities. Thus, it is possible to propagate several varieties of fruit or flowers on one stock.

The principal methods of grafting are by approach, scions, and buds. In approach grafting several parts of two or more plants growing from different stocks are united by bringing the roots, branches, or stems together. To effect this it is necessary to remove equal parts of the bark and unite the wounds by air-tight enclosures of grafting-wax, ligature, or clay. Scion grafting includes various methods, some of which are known as cleft, side, splice, tongue, saddle, crown, and whip grafting. In all of these forms it is necessary to bring the growing parts into apposition; that is, the edges of the bark must be arranged so the alburnum of both parts will be in close contact. The scion method may be performed both in woody and herbaceous plants, but union takes place only in case the processes of life are freely exercised. Bud grafting is practiced largely in fruit trees and roses. It consists of transferring the buds of one plant, along with a small section of the bark, to another plant in which a wound has been made. In all forms of grafting it is necessary to exclude air from the wound. Among the common materials used for this purpose are india-rubber, clay, and a mixture of beeswax and tallow. See **Budding**.

GRAFTON (grăf'tŏn), a city in West Virginia, county seat of Taylor county, on the Valley River. The surrounding country is lumber and coal producing. There are manufactures of railroad cars, machinery, flour, and ironware. The city has good railroad advantages, electric lights, several fine school and church buildings, and enjoys a good trade in merchandise. Population, 1900, 5,650.

GRAHAM LAND (grā'ăm), a region discovered in 1832 in the Antarctic Ocean, and claimed for Great Britain by Captain Biscoe. It is situated south of 68° south latitude, has an apparently large area, but is snow and ice bound and of little value.

GRAIL, also written **Graal**, **Greal**, **Grasal**, and **Sangrael**, according to legends, the cup used by Christ at the Last Supper, preserved by Joseph of Arimathea, and by him used to receive some blood of Christ at the crucifixion. An account of this vessel is given in the gospel of Nicodemus, a work not accepted as canonical. Many of the Moorish and Christian remains of early times indicate traces of the tradition and the use of various forms of worship into which a symbolic vessel entered. According to a legend, the Holy Grail, as it became known, was brought to England by Joseph of Arimathea in 63 A. D. Later the vessel was lost because the possessor to whom it had passed committed sin, and a search undertaken for the lost treasure by King Arthur and the Knights of the Round Table became known as the "Quest of the Holy Grail." At the capture of Cæsarea by the Crusaders, in 1101, a dish made of a single large emerald was found which was regarded as the Holy Grail, and is still preserved at the Cathedral of San Lorenzo in Genoa. The Holy Grail was reputed invisible to persons not pure and holy, and when anyone approached who was unholy the cup vanished. Wagner accords the story of the Holy Grail a prominent place in the opera of "Parcival," and Tennyson gives it a place in his "Idylls of the King." Lowell's "Vision of Sir Launfal" also makes mention of it. The numerous romances and poems found in literature referring to the Holy Grail are of much interest, particularly those of Arthur and the Knights of the Round Table.

GRAIN, a term applied to the common cereals, as growing plants, in gathered condition, or as seeds in bulk. Many of the grains are used in making meal or flour. They include corn, wheat, rye, oats, barley, rice, buckwheat, flax, and cotton. The principal constituents of grain seeds are starch, gluten, sweet mucilage, and an aromatic substance.

GRAIN ELEVATORS, the buildings used for elevating, storing, and loading grain for transportation into cars or vessels. Buildings for these purposes are maintained in all the grain-producing districts and in the large cities where the grain market centers. The capacity of grain elevators situated in the trade centers and shipping ports is very large. Those of Chicago have a capacity of 50,000,000 bushels; New York, 29,000,000 bushels; Minneapolis, 26,000,000 bushels; Buffalo, 15,000,000 bushels; St. Louis, 15,000,000 bushels, and Toledo, 7,000,000 bushels. The largest elevators in Chicago are 150 feet wide, 550 feet long, and have a height of 160 feet. In construction the bins and the buildings were formerly largely of wood, and the outside was encased by a brick or fireproof metallic covering. At present the construction is entirely of steel, modeled after the methods of constructing blocks of steel in cities, and thus furnish ample protection against fire. This form of construction also provides greater convenience and durability. The newer elevators in Buffalo are built largely of brick, though the frame and bins are of steel and iron. See **Elevator.**

GRALLATORES (grăl-là-tō'rēz), an order of birds known also as waders, and which frequent shores, banks, and marshy places. They have long legs, neck, and beak, wade in the shallow water in search of worms and insects, and a few species dive. Among the representative birds of this order are the plovers, coots, snipes, curlews, and bustards.

GRAMMAR, the science that treats of the principles and usage of language. English grammar is divided into four parts, orthography, etymology, syntax, and prosody. Orthography treats of elementary sounds, letters, syllables, and spelling; etymology, of the classification, derivation, and properties of words; syntax, of the construction of sentences; and prosody of the quality of syllables, of accent, and of the laws of versification. Every language has a grammar peculiar to itself. Comparative grammar is based on the study of words, analyzes them, and accounts for the changes they have undergone. It properly embraces a study of the growth of languages. However, comparative grammar is of recent origin. It dates from the development of knowledge of the Sanskrit as associated with the Indo-European group of languages. Among the eminent students of comparative grammar are Grimm, Max-Müller, Pott, and Schleicher.

GRAMPIAN MOUNTAINS (grăm'pĭ-ăn), a group of highlands in Scotland, stretching a distance of 150 miles from the northeast to the southwest, and attaining to heights of about 4,925 feet. A mountain system in the western part of the province of Victoria, Australia, is known by the same name.

GRANADA (grä-nä'dä), a former Moorish kingdom of Spain. It had an area of 11,060 square miles, which is now included with the three Mediterranean provinces of Almeria, Granada, and Malaga. Granada became a separate kingdom in 1225 and was made a part of Spain in 1492. The products of the region are cereals, domestic animals, sugar cane, fruits, and minerals.

GRANADA, an important city of southern Spain, capital of the province of Granada and formerly of the Moorish kingdom of Granada. It is situated on the Jenil River, on the foothills of the Sierra Nevada, and occupies a site about 2,000 feet above sea-level. Its streets are tortuous, but the houses are well built in the Moorish style. The city is connected by railroad, and within recent years has enjoyed some commercial growth. There are manufactures of saltpetre, woolen textiles, gunpowder, silks, and machinery. Among its public institutions are a splendid cathedral, a university, several public parks, and a number of schools and academies. The university was founded in 1531, contains advanced courses of study, and is attended by several hundred students. Granada was founded by the Moors in the 8th century. It became the capital of the Moorish kingdom in 1235, and, when conquered by Ferdinand and Isabella in 1492, contained a population of nearly 500,000. In 1610 the Moors were expelled from Spain, which caused the city to decline. At present it is surrounded by a strong wall. It still contains the Moorish palace of Alhambra, and also an unfinished palace commenced by Charles V. The present population is 73,695.

GRAND FORKS, a city in North Dakota, county seat of Grand Forks county, on the Red River of the North, about seventy-five miles north of Fargo. It is surrounded by a fertile agricultural country and has excellent railroad connections. Besides being the seat of St. Bernard's Ursuline Academy, it contains a Lutheran college and the University of North Dakota. Among the manufactures are farming implements, flour, woolen goods, cigars, and machinery. There are electric lights, waterworks, pavements, and other municipal improvements. Population, 1900, 7,652.

GRAND HAVEN, a port city on Lake Michigan, county seat of Ottawa county, Michigan, near the Grand River, about thirty-one miles west of Grand Rapids. It is surrounded by a fertile agricultural and fruit growing country, has a good harbor, two lighthouses, and is an important grain and lumber shipping point. Among the manufactures are furniture, machinery, sailing vessels, ironware, and cigars. The fisheries are an important factor in its prosperity. Several railroad and steamboat lines connect it, and it is improved by electric lights, waterworks, etc. Its public school system is well organized. Population, 1900, 4,743.

GRAND ISLAND, a city in Nebraska, county seat of Hall county, on the Platte River, 148 eight miles west of Omaha. The city is connected with western cities by several important railroads and has extensive railroad shops. It is an important grain and stock shipping center, and manufactures flour, beet-sugar, wire fences, brooms, machinery, farming implements, and cigars. There are electric lights, waterworks, and telephones. It has a fine courthouse, numerous churches, and good schools. Population, 1900, 7,554.

GRAND JURY. See **Jury.**

GRAND RAPIDS, an important city and county seat of Kent county, Michigan, at the head of navigation on the Grand River. It is the focus of many railroads, connecting it with other trade emporiums, and fine water power is obtained from the rapids in the Grand River. Its streets are well paved with asphalt and lighted with electricity. There are extensive connections by electric street railways, beautiful parks and gardens, and the river is crossed by many bridges. It is the seat of an excellent school system, contains a public library with 35,000 volumes, and has about ninety churches. Among its public institutions are the Michigan Soldiers' Home, St. John's Orphan Asylum, State Masonic Home, city home for the treatment of contagious diseases, and numerous hospitals. Its manufactories represent a capital of $16,500,000, employ 13,500 hands, and produce commodities valued at $21,000,000. Among the products are furniture, flour, clothing, machinery, utensils, and hardware. Near the city are gypsum quarries that produce an immense quantity of stucco. There are also extensive productions of brick and tile. Its furniture manufactories rank as the largest in the world. Population, 1904, 95,718.

GRANITE (grăn'ĭt), an unstratified rock, generally consisting of the three minerals, quartz, mica, and feldspar. The crystal grains of which it is formed vary in size, thus giving rise to the fine-grained and coarse-grained varieties, though the latter is also called pegmatite. The grain crystals range from the size of a pin-head to a two-foot cube. Such minerals as beryl, garnet, and tourmaline are found in granite formations, often in small particles scattered through the body. Granite is classed as an igneous or fire-formed rock, and originated under great heat and pressure beneath the surface of the earth, the pressure being produced in most cases by earth, but also by water and steam. It was formed from the pre-cambrian to the tertiary ages, the granite of the Alpine region of Europe being of the more recent formation. It is widely distributed and constitutes the most durable material for buildings and monuments. Among the productive granite districts of the United States are those of New England, New York, California, Michigan, and other states. It is also quarried extensively in Canada, Italy, Sweden, Switzerland, Russia, and other countries of Eurasia, and in Africa.

Granite varies greatly in hardness and color, according to the proportion of its constituents. The varieties in which feldspar predominates are inclined to crack, hence they do not possess much value for building. The harder species are used for building monuments, bridges, public buildings, and fortresses. Its hardness makes the expense for quarrying and cutting considerable, though this is at least in part overcome by its durability and beauty. Most varieties take on an excellent polish. Those containing considerable feldspar are reddish, the flesh shade of some being due to mica, while others are grayish-blue, gray, yellowish, pinkish, or drab. Among the ancient Egyptians granite was highly prized as building material and for tombs and monuments. Their statues were made largely of Oriental basalt found in the deserts of Egypt, while Oriental red granite served for monuments, such as Cleopatra's Needles and Pompey's Pillar. Their method of polishing brought out excellent results, while they also decorated granite products with finely-cut hieroglyphics. Egyptian ruins bear evidence that they preferred to use the varieties darkened by the presence of hornblende, the grayish, and those containing a flesh color due to the presence of feldspar.

GRANT, Frederick Dent, public man, eldest son of General Grant, born in St. Louis, Missouri, May 30, 1850. In 1871 he graduated from West Point, accompanied General Sherman to Europe the same year, and shortly after was appointed to command the military escort for the Southern Pacific surveyors. He became lieutenant-colonel in 1873 and served for eight years on the staff of General Sherman, and shortly after accompanied his father on the trip around the world. President Harrison appointed him United States minister to Austria in 1889, where he served four years, and in 1895 he became a police commissioner of New York City. In 1898 he accepted a command in the Spanish-American War, and subsequently served in the Philippine Islands as brigadier-general.

GRANT, Ulysses Simpson, eighteenth president of the United States, born at Point Pleasant, Clermont county, Ohio, April 27, 1822; died July 23, 1885. He descended from a Scotch ancestry that came to America in 1630, his father being Jesse R. Grant. While a boy he worked on the farm and in the tannery of his father, attended the public schools, and when seventeen years old received an appointment to West Point, from which he graduated as brevet second lieutenant in 1843. Soon after he was stationed at Jefferson Barracks, Missouri. In 1846 he entered the service in the Mexican War, and took part in all the battles fought by Scott and Taylor, except that at Buena Vista. He

declined the honor of being brevetted for gallant conduct at the battles of Palo Alto and Resaca de la Palma, but in 1847 was made brevet first lieutenant for bravery at Molino del Rey.

ULYSSES S. GRANT.

In 1848 he married Julia Dent, the daughter of a St. Louis merchant, and during the following six years served at various posts, attaining to the rank of captain in 1853. In 1854 he retired from the army and occupied himself in farming near St. Louis, in which he continued until 1860, and, not finding farming profitable, engaged as clerk in his father's leather business at Galena, Illinois. He drilled a body of volunteers at Galena in 1861 and soon entered the service as colonel, and in August of the same year was made brigadier-general of volunteers. His first services of great value were in 1862, when he captured Forts Henry and Donelson and fought the battle of Shiloh. In 1863 he secured victories at Port Gibson and Champion Hill and drove the enemy into Vicksburg, where he commenced a siege in May, and on July 4, 1863, received the surrender of that place with the garrison of 32,000 men. He then became major-general, was given command of the military division of the Mississippi, and by skillful management drove the Confederates from Tennessee. The rank of lieutenant-general was conferred upon him March 9, 1864, and three days later command of all the Union forces was given him. Thus raised into a field of greater latitude, he at once planned to confront the enemy at every important point by aggressive activity with the view of making it impossible for the armies of the Confederates to support each other. Accordingly he took the field in person against Lee in northern Virginia, sent Sigel to penetrate the valley of Virginia, dispatched General Sherman to Georgia, and directed Butler to threaten Richmond.

Grant's operations against Lee were characterized by terrible battles from the time he left the Rapidan, including those of the Wilderness, Spottsylvania, North Anna and Cold Harbor, but he succeeded in causing the enemy to fall back steadily with irreparable losses. To relieve Butler at Bermuda Hundred he crossed the James below Richmond, and thus included Petersburg in the final contest. The campaign from the Rapidan to Appomattox continued from May, 1864, to April, 1865, though the country at times became discouraged and the government advised him to abandon his line of aggression. However, Grant kept steadily on. After the battle of Spottsylvania, in May, 1864, he sent a dispatch to the government, which closed with these words: "I propose to fight it out on this line if it takes all summer." Early in April, 1865, Richmond was evacuated, Lee retreated to Lynchburg, and on April 9 surrendered to Grant at Appomattox. The great battles fought under General Grant stand among the most terrible in the history of the world, while the nobility of character displayed by him turned many of his opponents into his warmest friends. After the war he had charge of mustering the army out of service and disposing of the enormous stores of the government. In 1866 he submitted a plan to the government for the reorganization of the army, which at once became the basis of army organization. In the same year congress created the rank of general of the armies, to which position he was appointed, and other honors were bestowed upon him by the grateful public.

The republican national convention in session at Chicago in May, 1868, nominated General Grant for president on the first call of states. Of the 294 votes cast in the electoral college he received 214 and Horatio Seymour eighty. Four years later he was re-elected, receiving 286 as against sixty-six that would have been cast for Horace Greeley if he had lived. After the close of his second term he made a tour around the world, and was received with marked enthusiasm in the various foreign countries he visited. An effort was made to again nominate him for president in 1880, but it failed. During his administration the Pacific railroads were completed, the Alabama Claims settled, the national debt funded, and the fifteenth amendment passed. President Grant was a plain man, possessed much common sense, but was unfortunate in the choice of advisers and lacked skill in public affairs. His reputation is due to his moral and physical courage and military achievements. Toward the latter part of his life he joined others in a banking enterprise at New York City in which all his property was lost. The writing of his "Memoirs" occupied the last year of his life. In March, 1885, congress placed him on the retired list as general. His death occurred from a cancer at the root of the tongue, after much suffering. The remains were buried in Riverside Park, New York City, with honors never before accorded an American.

GRAPE, the wine plant or its fruit. It has been cultivated from remote antiquity, and is a native of the region surrounding the Caspian Sea, extending as far west as the Crimea. Several varieties of wild grape of inferior quality are native to many countries and grow extensively in the forests of America. The cultivated varieties thrive in the warm and temperate zones. They produce berries in clusters, some of which are seedless, but others have from one to four stony seeds. The Phœnicians introduced the

grape into Europe from Asia, and soon after America was settled it was brought to the new world. Since then many of the native varieties have been improved by cultivation and new species originated by mixture with those of Eurasia. The grape plant may be

GRAPE VINE

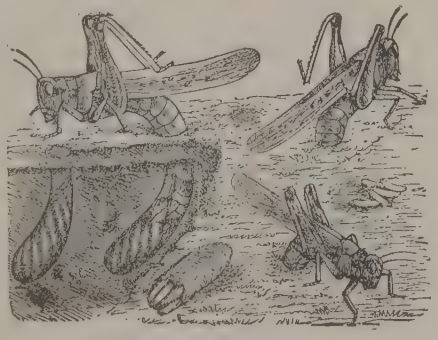
propagated by inoculation, cuttings, grafting, and seeds. Sweet grades of wine are made from grapes allowed to be left on the vines until over-ripe, when they contain a larger per cent. of saccharine matter. The wine products of France, Spain, and Germany are noted, while for productiveness and large varieties few countries exceed South Australia. In many of the warmer climates the wine plant bears twice a year. The application of artificial heat has materially increased the production, though this was not practiced extensively until within the last century. California is the greatest wine-producing state of the United States, and its products now rival those of Germany and France.

GRAPESHOT, a class of spherical shot put up in stands, generally consisting of three tiers with three shots in each tier. The use of case-shot has superseded largely that of grapeshot.

GRAPHITE (gráf'ít), a mineral carbon, also called blacklead and plumbago. It is found in the oldest rock formations, occurring in many portions of the United States, especially in New York, Pennsylvania, Michigan, Alabama, and California. There are also extensive deposits in Canada, at Altai, in Silesia, Bohemia, and Ceylon. It occurs in masses or beds, having a chemical composition similar to anthracite coal, and may be made artificially from coal. The marketable grades have a highly metallic luster, granular texture, iron-gray color, and are soft to the touch. It is quite unchangeable in the air. In a closed vessel it may be heated without effecting a change. Its use is largely for crucibles, portable furnaces, and pencils. It is also used in electrotyping, for protecting iron from rust, and various other purposes in the arts and industries. The manufacturing establishment founded at Stein, Germany, by A. W. Faber is one of the oldest and largest in the world engaged in the manufacture of pencils. In making pencils the larger blocks of pure graphite are utilized in their natural state by cutting them into pieces and forms of proper size, while the cheaper grades of pencils contain graphite secured by grinding the smaller particles to powder and purifying them by washing, and afterward pressing and drying into proper forms. The harder varieties of graphite pencils are made by adding a small quantity of clay.

GRASS (gràs'), an important and extensive order of endogenous plants, including about 450 genera and 4,500 species. They are distinguished from sedges by their generally cylindrical, pointed, and hollow stems, while sedges are largely triangular in shape, pointed, but solid. There are two classes of grasses, artificial and natural. The former include such cultivated plants as trefoils, sainfoin, and clover grown for fodder, and the latter embrace the grasses proper. Both of these are of incalculable value on account of the nutritious herbage furnished for stock, and the various textiles for manufactures. The soil is enriched by the decaying substances of grasses, and washing away of the surface soil by rains is hindered largely by their roots. Many of the grasses are annuals, but those growing in forests and many having woody structure are not. Different varieties grow on hills, slopes, valleys, and marshes, and the quality of the soil is often indicated by the kind of grass it bears. The growth in a single season varies from minute forms to heights of fully one hundred feet. Bamboo grasses are woody, while grains rank with the herbs. The different cereals and their products, such as beer, paper, sugar, rum, medicine, bread, and starch, are treated in separate articles.

GRASSHOPPER (gràs'hŏp-pẽr), an order of insects characterized by large, strong hind legs fitted for leaping, and allied



GRASSHOPPERS.

to locusts, crickets, and cockroaches. Distinguishing and characteristic sounds are produced, as in the locust, by rubbing the wings and wing-covers together during flight, and others by rubbing the serrated hind legs against the wing-covers, while the peculiar sounds of the katydid and cricket are caused by rubbing one wing-cover on the other. The common grasshoppers have long, thread-like antennæ, wings folded together like the

sides of a roof, or in some species merely rudimentary, and usually are grayish or green in color. They are numerous in all parts of the world, often occurring in such numbers as to be destructive to crops. In some of the western states they have been known to obscure the sun for hours in their flight and, when alighting, to be so numerous as to stop trains of cars. Some species are said to live on insects, but the greater number feed on grass and herbage.

GRATTAN (grăt'an), **Henry**, orator and statesman, born in Dublin, Ireland, July 3, 1746; died June 4, 1820. He entered Trinity College when seventeen years old, and began the study of law at Middle Temple, London, in 1767. He was admitted to the bar in 1772, and elected to the parliament of Ireland in 1775. In the capacity of legislator he took an efficient part for the reform of the civil service and the improvement of commercial interests. In 1780 he entered upon a plan to separate Ireland from England, for which purpose he moved resolutions, and in 1782 led a revolutionary movement which resulted in Irish independence. A gift of $250,000 was voted him by the Irish parliament, and other distinctions were accorded him for his public services. Subsequently he opposed the union proposed in 1800, and, when Pitt's measure was passed, he became a member of the imperial parliament. In 1806 he was elected for Dublin and again advocated the former cause of Irish independence. His last effort to bring about the freedom of his country was made in 1820, but his death occurred before material results were effected. Grattan was noted for his patriotic devotion, powerful oratory, and masterly ability to enthuse the people. He was buried in Westminster Abbey, where a tombstone marks his place of burial.

GRATZ (grĕts), or **Gretz**, an important city in Austria, capital of Styria, on the Mur River, about ninety miles southwest of Vienna. The site of the city is a beautiful eminence about 400 feet above the river; the streets are well improved, and important railroad connections facilitate commercial enterprise. Besides its excellent school system, there is a university founded in 1586, attended by 1,250 students, and contains a library of 90,000 volumes. Other excellent buildings are the Gothic cathedral, founded in 1456 by Frederick III., a Gothic church, numerous monasteries, several government buildings, and many splendid residences. The Hungarians made an attack upon the city in 1481, but were repulsed, as also were the Turks in 1532. It was taken by the French in 1797 and 1809. The manufactures include silk, woolen, and cotton goods, machinery, ironware, vehicles, soap, sugar, railroad cars, wine, and candles. There are electric lights and street railways, waterworks, pavements, several public parks, and many fine monuments. Population, 145,260.

GRAVEL (grăv'ĕl), the general name of small stones or pebbles mixed with sand, loam, or clay. It is formed by the action of water disintegrating rocks, the particles appearing first as boulders, but later are worn down to pebbles, sand, and even silt. Gravel forms useful material in building highways and ballasting railroad grades.

GRAVELOTTE (grāv-lot'), a village in Lorraine, about eight miles west of Metz, Germany. It is noted as the scene of a severe battle on August 18, 1870, between the Germans and the French. The German army consisted of 211,000 men under the personal direction of King William of Prussia, and the French of 140,000 under Marshal Bazaine. The German losses were 20,000 and the French 13,000, but the army of the latter was compelled to retreat to Metz, where the whole force surrendered to Prince Frederick Charles.

GRAVITATION (grăv-ĭ-tā'shŭn), the force with which all heavenly bodies attract each other, often called the attraction of gravitation. That heavenly bodies attract each other was believed by Democritus and Epicurus, and also by Bacon, Galileo, and Kepler, but it was left for Newton to discover the universality of gravitation and the law of its action between all bodies. The law he announced is that every particle of matter in the universe attracts every other particle of matter with a force directly proportional to its quantity of matter, decreasing as the square of the distance increases. In all heavenly bodies two opposing forces are constantly at work, one an attractive and the other a projectile force. If the attraction of gravitation alone operated, all planets would fall into the sun; or, if the projectile force alone existed, all planets would go off into space and move in a straight line forever, unless ultimately brought to rest by some external agency.

The two forces of gravitation are so nicely balanced that all heavenly bodies move around the central luminary with an exact precision, and when a planet is nearest the sun its projectile force is increased to exactly balance the increased force of attraction. Not only are the planets attracted by the sun, but they attract the sun. Their revolution is not properly around the sun, but all heavenly bodies, including the sun, revolve around the center of gravitation, which is a point at or near the center of the sun. The same law operates in the case of all the satellites and primary bodies; they all attract each other directly as their respective masses, and inversely as the square of their distance. The laws of gravitation are well known, but why interposed substances will not interrupt gravitational tendencies, and how it can act at a distance without contact or connection, are problems not yet fathomed.

GRAVITY (grăv'ĭ-tў), the natural force exerted on all terrestial matter, by which all bodies have a tendency to fall toward the center of the earth. This attraction holds

all objects, as rock, water, animals, air, buildings, metals, and wood, and from it they receive the property called weight. If it did not exist, all objects loose on the earth's surface would be inclined to pass off into space by themselves. It is greatest at the surface of the earth, and diminishes as one goes upward, being a thousandth part less on a mountain 10,000 feet high. It is exerted alike on all bodies of equal density, and remains constant at a given place. At the poles its influence is greatest and it gradually decreases toward the equator. Tests with spring balances have demonstrated that bodies appear to become heavier as we proceed toward the poles. This is due to the centrifugal force caused by the revolution of the earth upon its axis, which is greatest at the equator and has a tendency to throw bodies off the earth. The difference in weight is $\frac{1}{194}$, or a body weighing 194 pounds at the equator weighs 195 pounds at the poles. From this is learned that if the earth turned seventeen times faster upon its axis than it does, gravity would be overcome, and bodies would lose the property of weight. Gravity is measured by the acceleration of a falling body, and by an oscillating pendulum. Increase in the rate of a falling body in the United States is about 50.2 feet per second, and the variation of acceleration in different places determines the gravity. A pendulum oscillating once a second at sea-level in the latitude of New York, and at places having greater or less gravity, it must be shorter or longer respectively to oscillate the same number of times. All heavenly bodies have gravity, the intensity of which is modified by their volume, density, velocity, and the attraction of gravitation.

GRAY, Asa, eminent botanist, born in Paris, New York, Nov. 18, 1810; died Jan. 30, 1888. He graduated at the Fairfield College of Physicians and Surgeons in 1831, and taught natural history in the schools of Utica until 1833, when he became assistant at the College of Physicians and Surgeons in New York City. Soon after he began to write on natural science, and in 1838 published his first work in botany, entitled "Flora of North America." In 1834 he became botanist of the United States, made an exploring expedition to the islands of the South Pacific, and prepared the "Botany of the Wilkes Expedition." After studying a year in Europe, he accepted a chair in the University of Michigan in 1837, and in 1842 became professor of natural history at Harvard University. In 1873 he resigned at Harvard to succeed Agassiz as regent of the Smithsonian Institution, and four years later was elected a member of the French Academy of Sciences. The last fifteen years of his life were devoted to study and writing in Cambridge, Mass. Gray was a personal friend of Darwin, and accepted the modern theory of evolution published by that writer, but did not reject the tenets of Christianity. As a botanist he took rank among the leaders of the age, was a successful teacher of that science, and was among the first to classify American species of plants in accordance with the natural system. Among his important writings not named above are "Botany of the Northern United States;" "How Plants Grow;" "Relation of the Japanese Flora to That of North America;" "Darwiniana," and "Genera of Plants in the United States." For a period of thirty-five years he was an editorial writer of the "American Journal of Science and Art." Gray's Peak in the Rocky Mountains was named in his memory.

GRAY, Thomas, eminent poet, born in London, England, Dec. 26, 1716; died July 30, 1771. On account of the separation of his parents he was brought up by his mother and sister, and was educated at Eton and Cambridge. While at Eton he met Horace Walpole, son of the prime minister, and won his firm friendship. As a student he was mild and melancholy, manifesting a pronounced aversion to mathematics. After studying four years he accompanied Walpole on a tour through France and Italy, and later returned to Cambridge to secure a degree in civil law, where he also took up his permanent residence. It was his habit to make notes wherever he went, observing minutely all the natural scenery, and to detail carefully matters of interest to his literary friends. His "Ode to Eton College" was written in 1742, and two years later followed his "Elegy in a Country Churchyard," though the latter was not published until 1751. It is doubtful whether any English poem has had a wider reading than the "Elegy," which maintains an ever-abiding interest. In 1757 he was offered the laurel and emoluments of poet-laureate, but declined. He became professor of modern history at Cambridge in 1768 and, though a laborious student and among the most learned of men, his work in this capacity was not highly successful. Personally Gray was popular and enjoyed many warm friends. His spirits were often depressed, and his writing and speaking deliberate and slow. The literary treasures he bequeathed to the world are few in number, but take high rank. His principal productions, besides those already named, are "The Bard;" "On the Progress of Poesy;" "Pindaric Odes;" "Fatal Sisters," and "Descent of Odin." His letters and poems in Latin are admirable and surpassed by few.

THOMAS GRAY.

GREAT BASIN, a vast triangular plateau between the Wahsatch and Sierra Nevada mountains. It includes nearly all of Nevada and part of Idaho, Oregon, and California. Its length from north to south is 800 miles, and its breadth in a line crossing Great Salt Lake equals about 500 miles. The surface is diversified by valleys and mountains, among which numerous streams and salt lakes abound, but none has an outlet to the sea. In early geologic times the basin formed a vast lake.

GREAT BEAR LAKE, a large fresh-water lake in the western part of North America, situated in the territory of Mackenzie, Canada. Its coast line is irregular and, being crossed by the Arctic Circle, its waters are frozen half of the year. Keith and McVicar bays are the principal coast indentations. The surface area is 14,000 square miles and the elevation above the sea 245 feet. It discharges into the Mackenzie by the Great Bear River.

GREAT BRITAIN, the British Empire, including the British Isles and extensive colonial possessions. The British Isles embrace two principal islands, the most important of Europe, the largest of which contains the three countries of England, Scotland, and Wales, and the smaller Ireland. The two islands and those lying adjacent form the United Kingdom of Great Britain and Ireland. The eastern boundary of the British Isles is formed by the North Sea, the southern by the Strait of Dover and the English Channel, and the western and northern by the Atlantic Ocean. Ireland is separated from the larger island by the North Channel, Irish Sea, and St. George's Channel. The total area of the British Isles is 120,979 square miles, and the population 41,950,000. As a distinct name Great Britain was first used to distinguish the English government from that of Brittany in France, though it was employed only in a poetic sense until 1604, when James I. began to style himself king of Great Britain.

The surface of the British Isles is various, being mountainous and rugged in the northern portion, especially in Scotland, while the southern part consists of undulating plains. Immense bogs characterize the interior of Ireland, but its coast regions are fertile and of moderate elevation. The most elevated peaks of Scotland are among the Grampians, which attain to heights of about 4,410 feet. In Wales the highest elevation is Snowdon, 3,575 feet, and the most elevated in Ireland is Carn-Tual, 3,410 feet. The mountain regions extend from Scotland and Wales into England and culminate in Scawfell, 3,200 feet. As a whole the climate of the British Isles is favorably modified by the Gulf Stream, which sweeps across the Atlantic Ocean from North America, and by the prevailing southwest winds. These natural agencies cause the climate to be agreeable to vegetation, moderate in temperature, and exceedingly healthful. The average winter temperature is about 25°, and during the summer about 60°. Numerous rivers and lakes furnish ample interior water surface for navigation, fisheries, and facilities to propel machinery and supply cities with water. All the available land surface fit for cultivation is utilized with much care, its fertility maintained by a high state of cultivation and fertilizing, and many varieties of vegetables, fruits, and cereals are produced. All the domestic animals reared in the United States are grown successfully, especially milch cows, dairying being an important enterprise. The mineral wealth consists largely of coal and iron, though other deposits abound, such as basalt, granite, gypsum, tin, zinc, lead, oil-shale, salt, slate, and sandstone. The annual production of coal aggregates 200,000,000 tons, of which about 35,000,000 tons are exported, while the production of iron is 13,500,000 tons and is consumed in home manufacture.

It may be said that the British Isles form a distinctively manufacturing community, its cotton, woolen, linen, and silk textiles having been renowned for many centuries. Its productions of tinware, ironware, machinery, glass, furniture, porcelain, and other useful commodities take high rank among the products of the world. At present it ranks as one of the most important manufacturing nations, and in the production of merchant-marine and shipbuilding it occupies first place. The annual output of vessels is about 750, these having a onnage of 1,850,000. Commercially it stands in an important position among the nations, being a large importer of food products and an exporter of manufactured articles. The total annual imports are valued at $2,250,000,000, and the exports at $1,350,000,000. At present the import trade, based on values, is in the following order: United States, France, Holland, Germany, Russia, Belgium, Spain, and Denmark; while its exports are largely to the different colonies, though its export trade with France, Germany, and Brazil represents large values. The navy of Great Britain is the largest in the world and includes, besides others, sixty battleships, twenty armored cruisers, one hundred protected cruisers, eighty torpedo boat destroyers, and one hundred torpedo vessels. The total displacements of vessels is estimated at 1,050,000 tons.

Educationally the British Isles take a high rank, though the per cent. of illiteracy is much greater than in Germany and the Scandinavian countries. Until 1870 education was voluntary, but in that year measures to promote elementary education were passed, and soon after attendance was made compulsory for all children between the ages of five and fourteen. In 1872 the educational law for Scotland was enacted, and by its terms attendance was made compulsory from five to thirteen years. Schools are main-

tained in all districts by general taxation and public grants. There are also many industrial institutes relating to agriculture, dairying, commerce, mining, and the fine arts. In Ireland the educational status is not as well advanced as in the other portions, but a spirit in favor of progressive teaching and for greater educational advancement is becoming more marked. Among the most celebrated higher institutions of Great Britain are those at Cambridge and Oxford. At the former is a teaching staff of about 125, and an attendance of 3,200; and at the latter an attendance of 3,500. The University of Dublin is the most noted in Ireland, and the four celebrated institutions of Scotland are at Glasgow, Aberdeen, Edinburgh, and St. Andrews. Besides these, there are about ninety colleges in the British Isles, which are supported partly by public grants, but mostly by private and religious societies. All forms of religious worship are tolerated. However, in England and Wales the Episcopal and in Scotland the Presbyterian churches are favored by state endowments. In this portion of the British Isles the people are largely Protestants, while in Ireland about two-thirds belong to the Roman Catholic Church. Among the numerically strongest Protestant sects in Ireland are the Presbyterian, Methodist, Independents, Baptist, and Friends. The revenues of the government for all purposes are derived from various sources, but the most important of the direct taxes is the income tax, which is levied on the income of individuals. The national debt is about $3,100,000,000.

The colonial possessions of Great Britain are more extensive than those of any other nation. They include regions so vast and diversified that, like Rome, the nation is perpetually at war. The possessions annexed as crown colonies and protectorates include about one-fifth of the entire area and population of the earth. All more important island and continental provinces are treated in separate articles. They are distributed as follows:

CONTINENTS AND ISLANDS.	AREA IN SQUARE MILES.	POPULATION.
Africa	2,514,760	35,665,422
America	3,614,338	6,882,960
Asia	1,800,258	297,223,431
Australasia	3,173,558	4,993,900
Europe	121	196,889
In the Pacific	147,377	10,000
Total	11,250,412	344,972,602

GREAT EASTERN, the largest iron steamship ever built. It was constructed in 1854-58 at Millbank, England, for the Eastern Navigation Company, after designs made by Scott Russell, and intended for service to Australia by way of the Cape of Good Hope. Its length was 680 feet; breadth, eighty-three; over the paddle-boxes, 118; and seventy feet high to the bulwarks. It had one mast of wood and five of iron, a capacity of 11,000 horse power, and could spread 7,000 yards of sail. The capacity was ample for 5,000 persons when all compartments were fitted out, though the design was to carry only about 1,000 passengers and devote the remaining space to the cargo. The cargo capacity was 20,000 tons. It cost $300,000 to launch the vessel, which was done on the Thames, Sept. 8, 1859. The enormous expense of manning and keeping up repairs made the enterprise disastrous. After laying the Atlantic Cable and several others, it was used to transport troops and served as a coal hulk at Gibraltar in 1884. Subsequently it served as a curiosity and in 1888 was sold at auction in Liverpool, and broken up for repair and building material.

GREAT FALLS, a city in Montana, county seat of Cascade county, on the Missouri River, near its falls at the mouth of the Sun River, about seventy-five miles northeast of Helena. The city has an excellent public school system, electric lights, sewer system, city waterworks, street railways, and a large public library. Several lines of railroad connect it with other commercial centers and furnish ample facility for the transportation of products from numerous gold, silver, copper, iron, lead, and coal fields in its vicinity. Many millions of dollars are invested in mining machinery and refining works. An immense dam at Black Eagle Falls furnishes motive power for manufactories. Among the products are earthenware, clothing, cigars, machinery, and brick. The city has a growing trade in fruits, cereals, and merchandise. Population, 1900, 14,930.

GREAT FISH, or **Back River**, a stream discovered by Sir George Back. It rises in Lake Sussex, in Canada, has a northeasterly course of about 500 miles, flowing into Elliot Bay.

GREAT KANAWHA (ka-na'wą), an important river flowing into the Ohio, rises in the Blue Ridge Mountains of North Carolina. Its entire length is 450 miles, about one hundred of its lower course being navigable. The upper portion is called New River, which has a general direction toward the northeast through Virginia, but makes a bold turn into West Virginia, and thence the Kanawha has a northwesterly course. Among the towns on its banks are Charleston, West Virginia, and Pearisburgh, Virginia.

GREAT PEDEE RIVER, a stream formed in North Carolina by the confluence of the Yadkin and Rocky rivers, passes into South Carolina, where it receives the Little Pedee, and flows into Winyan Bay. It has a total length of 415 miles and is navigable to Cheraw, a distance of 150 miles.

GREAT SALT LAKE, a salt-water body situated in the northern part of Utah. It is about eighty-five miles long, from twenty to forty-eight miles wide, and is 4,150 feet above sea-level. Its only outlet is by evaporation, hence the water is one of the most concen-

trated salt brines known in the world, containing about 20 per cent. of sodium, and slight quantities of other salts. No fish subsist in the lake, but its shores are frequented by gulls and wild fowl. The discharge from Lake Utah, a fresh-water lake, is carried into it by the Jordan from the south. Other rivers flowing into it include the Ogden, Bear, and Weber. The first account of this lake was made in 1689 by Baron La Hontan (1667-1765), who based his report on information given by the Indians. In 1776 Escalanta, a Franciscan friar, mentioned the lake, and Fremont explored it in 1843. The adjacent geological formations give evidence that in early times the lake was an immense body and at least 1,000 feet deeper than at present. The present average depth is about eight feet and at its deepest point it is about thirty-five feet. The valleys lying adjacent have been improved greatly by irrigation, and now constitute the richest part of the state. Numerous railroad lines traverse the adjacent country, and near it are the thriving cities of Salt Lake City, Ogden, and Logan.

GREAT SLAVE LAKE, a large, irregular fresh-water lake in Mackenzie, Canada, about 325 miles long and eighty miles wide. It has irregular shores, numerous islands, and is frozen over half the year. The discharge from Athabasca Lake flows into it, and its surplus waters are carried to the Arctic by the Mackenzie River.

GREECE, a country in southeastern Europe, occupying the most easterly of the three large peninsulas that project from Europe into the Mediterranean. The northern boundary is formed by Turkey, eastern by the Ægean Sea, southern by the Mediterranean, and western by the Ionian. Together with the Ionian Islands, the Eubœa, and the Cyclades, it has an area of 25,040 square miles, and a population of 2,585,000. The boundaries of the interior provinces are formed largely by mountain ranges, all of which have associated with them historic incidents of much interest. A continuation of the Balkan Mountains, known by the general name of Pindus, extends across the boundary line from Turkey, and divides and sub-divides into numerous chains. The coast line is extraordinarily irregular, being indented by many gulfs and bays valuable in commercial enterprises. There are numerous islands belonging to Greece, being separated from the mainland and from each other by navigable channels, and like the mainland contain numerous mountain elevations. The most prominent peak is that of Olympus on the northern boundary, 9,750 feet high. It is the most historic, being reputed the dwelling place of the gods mentioned in ancient mythology. Other mountain peaks include Parnassus, 8,075 feet, and Cithæron, 4,615 feet, in central Greece; and Taygetus, 7,900 feet, situated in the Peloponnesus. There are numerous rivers, but all are quite small and unimportant, except as they are associated with legends and history. The soil is generally fertile, and under modern methods of cultivation is beginning to yield more extensively than at any time since Greece enjoyed its ancient prosperity. As a whole, the climate is temperate and salubrious. The atmosphere is remarkable for its clearness and beauty, rivaling the Italian sky, and the country generally healthful, though it is not thought as agreeable as in ancient times. The mineral resources are important, while manufactures are receiving growing attention.

Greece is largely an agricultural country. The ownership of the land is, with few exceptions, vested in the peasant farmers. Among the chief agricultural products are rye, barley, maize, hay, cotton, wheat, and vegetables. Special attention is given to the culture of grapes, olives, tobacco, shrubbery, and silkworms. Among the domestic animals are horses, cattle, and sheep. The mineral resources are extensive, including rich deposits of zinc, lead, gypsum, iron, sulphur, emery, galena, and manganese. At present the manufactures are comparatively unimportant, but increased attention is given to the production of flour, clothing, leather, fabrics, dried and canned fruits, machinery, glass, tobacco, thread, and pottery. Fishing is an important industry and engages the attention of numerous interests along the coasts, such as dredging, canning, and trading. Interior commerce is carried on largely by navigation on canals and natural waterways, though railroad construction is beginning to receive some attention, and numerous telephone and telegraph connections exist. Athens is the capital and metropolis. Other cities include Piræus, the port of Athens; Corfu, Patras, and Trikala.

The state of education has been greatly neglected, and in consequence a large proportion of the people are unable to read and write, the proportion of illiterates being estimated at twenty-five per cent. This is due not so much to the inclination of the Grecians, but more particularly to the fact that the country has been subject to distracting internal and foreign wars, and, as an inevitable result, the national finances have long been embarrassed. Within recent years the school system has been modeled after that of Germany, in which the realschulen are important factors in fitting for the important industries. By national law all children between six and twelve years of age are required to attend school, but the law has not been enforced strictly in the more impoverished districts. Besides the public elementary schools, there are private institutions and a system to promote higher education, including numerous colleges, academies, and the National University at Athens. Several schools have also been established by people from Germany and the United

States for the purpose of promoting the investigation and study of antiquities with the view of adding to general knowledge of Grecian art and history. Religious worship is free and unrestricted, though almost the entire population belongs to the Greek Catholic Church. Newspapers and magazines are beginning to circulate quite extensively since education is receiving more attention, and an efficient postal system has been established. Service in the army is compulsory from the ages of nineteen years to forty, if necessary, though two years' service with the colors enables admission to the reserve, and the remainder to the landwehr, these three divisions constituting the army. Both the army discipline and organization are modeled after the German system. The entire peace footing is about 30,000, a number larger than that maintained by the United States during the greater period of its history. There is a war footing of 98,000. The entire navy as now organized is composed of forty vessels of all classes.

Historically, Greece occupies an important position, though mostly because of its glory in the remote past. Hellen is its fabled ancestor, and was regarded the son of Deucalion and Phyrra, two survivors of the deluge. From him descended the four celebrated divisions—the Dorians, Ionians, Æolians, and Achæans. Collectively, these were called Hellenes, and the country Hellas; the names by which the Grecians still call themselves and their country. The Italians originated the word Greek from their northern tribes Græci, which, through the Romans, passed into common usage among the Europeans. The Achæans were renowned in war, but the Ionians and Dorians were the most important divisions, and respectively founded the two great cities of Athens and Sparta. A people called the Pelasgians occupied the country before the Grecians secured possession, but they probably were earlier Aryan immigrants from Asia, since they were readily assimilated by the intellectually superior Grecians. Phrygia in Asia Minor is regarded the nativity of the Grecians before coming to Greece, and it is thought that they came by way of the Hellespont to the islands of the Ægean Sea. Civilization and religious rites were brought over from Egypt and Phœnicia.

The Heroic Age of Greece has reference to the historic events of Hercules, Theseus, Minos, Jason, and the celebrated Trojan War, all of which are treated in special articles. It is thought that the Trojan War occurred about 1194-84 B. C. Authentic history begins about 1000 B. C., at which time the celebrated Dorian invasions of two centuries were ended. These were followed by the establishment of the Dorian states in the Peloponnesus, colonial invasions of Asia Minor, the conquests of Crete, Rhodes, Cos, and other islands of the Ionian and Mediterranean seas. The best picture of early Greek life is given in the famous works of Homer, the "Iliad" and "Odyssey." While mixed with poetic fancy, they make us acquainted with the Grecian deities, customs, industries, games, commerce, and arts of war.

The Dorians and Ionians were long powerful rivals for supremacy among the Hellenes. While the former established their stronghold at Sparta, the latter made Athens their seat of influence. Lycurgus prepared a code of laws for the Spartans, under which the people secured greater rights and witnessed material prosperity. The culture of Sparta was military, a condition brought about largely by the need of means of defense and the promotion of commerce. At Athens Solon prepared a code of laws, repealing many that inflicted severe forms of punishment. His laws made ample provision for the intellectual, physical, and moral culture. Under the legislation introduced by Solon splendid temples and public improvements were built, libraries founded, and learning patronized. Though hostile to each other, the several states of Greece united when King Darius of Persia landed at Marathon in 490 B. C. for the purpose of conquering the Athenians. In the battle that ensued, Miltiades led an army of 10,000 Athenians and succeeded in defeating the Persians, the battle being classed as one of the decisive engagements of the world.

In 432 B. C. the Spartans entered upon a general war to conquer Athens, and after twenty-seven years established Spartan supremacy. The oppressions that followed caused an alliance between a number of the states and the Persian king, and in 371 led to the defeat of the Spartans at Leuctra. Greece attained its height of prosperity and military power during Macedonian supremacy, particularly under Alexander the Great, son of Philip of Macedon, who reigned in 336-323 B. C. This great leader defeated Darius, overthrew the Persian Empire, annexed large parts of Asia and Africa, and among other cities founded Alexandria. The brief reign of Alexander was followed by internal dissensions and an invasion by the Gauls in 279 B. C., and the nation was threatened by the states that rose in the West. Had Greece remained united by strong internal ties, it might have resisted the Romans, but, owing to local differences, all of Greece became a Roman province after the capture of Corinth in 146 B. C. Under Roman rule a period of peace and prosperity prevailed. The Goths captured it in 395 A. D., but the same year Rome was divided into the Eastern and Western Empires, and from that time till 1453 it remained with the latter. While belonging to the Byzantine Empire (q. v.) it retained renown for its learning and was turned from paganism to Christianity.

In 1453 Greece was conquered by Mohammed II., and in 1669 came under absolute control of the Turks. A war of independence

began in 1821, and with the help of Russia, France, and England, it threw off Turkish rule in 1828. The Greek statesman, Count Capo d'Istria, became president, but in October, 1831, he was assassinated. The powers in 1832 elected Otho, second son of the king of Bavaria, as king of Greece, who reigned thirty years and abdicated. In 1863 Prince George of Denmark was chosen king with the title of George I. Owing to the cruel treatment of Greek Christians in Crete by the Turks, hostilities continued more or less for several centuries, and war broke out anew between Greece and Turkey in 1897, which proved disastrous to the Grecian army in every battle. However, it aroused anew the spirit of nationalism, which is exemplified in its present efforts for greater prosperity. The government is a constitutional monarchy, and the legislative branch of 207 members is elected by popular vote for a term of four years. The advisory council of the king consists of ministers of war, justice, interior, marine, finance, and public instruction. Among the chief sources of revenue are direct taxes, duties and excise, stamps and monopolies.

The Greek language is a branch of the great family of Indo-European languages, and was spoken as early as the 15th century B. C. From Asia Minor and southeastern Europe it was carried by colonies of Greeks to Sicily, lower Italy, and other regions on the Mediterranean. Ultimately it became the spoken language of Macedonia, Syria, Egypt, and the Byzantine Empire. Ancient writers, especially those associated with Greece and Rome, traced the language to a race of people called by them Pelasgi, who were regarded by some more recent writers as of Gothic origin, and who were undoubtedly the people from whom both the Greeks and Romans had their origin. Little was known of the Greek language to the people of western Europe during the Middle Ages, but with the revival of learning came a renewed interest in the language and literature of the Greeks, who came to be known as a people of much culture and refinement. The Dutch scholar, Erasmus (q. v.), not only induced a widespread interest, but carried Greek as a branch of study to Cambridge University in 1510. There were three distinct dialects, known as the Ionic, Doric, and Æolic. Of these the first two were the most important, since they entered more largely into the literary treasures of Greek masters. The Ionic was the dialect used by Homer, Hesiod, and Herodotus, and thus is embodied in the master productions known to modern students. In northern Greece and the colonies the Doric prevailed largely, and it is represented in the writings of Pindar and Theocritus. As a whole, the language was remarkable for its beauty and elasticity, on account of which many of its elements are retained in the modern European languages.

Much of Greek literature, as known to modern writers, is as old as the history of the Greek language. The first works known to us as Greek writings are the "Iliad" and the "Odyssey," two productions generally attributed to Homer. They are unlike the first writings that have come down to us from other nations in that their language is highly cultured, instead of being a recital of simple fable or folk-lore. From this it is evident that learning had flourished long before the time of Homer, and that the poetic art had a firm hold upon the Greeks many centuries before the Christian era. Both these productions are epic poems, the "Iliad" treating of the war against Troy, and the "Odyssey" reciting the adventures of Odysseus, a celebrated Greek hero of the Trojan War, while on his return voyage to Greece. It is generally assumed that these epics were passed from generation to generation in a spoken form, and that they were not committed to writing until after many years. This circumstance has given rise to doubts as to their authorship, it being quite probable that Homer only collected and compiled them into convenient form. Hesiod, the eminent poet of nature, flourished about a hundred years after the time of Homer, and is the author of "Works and Days," an epic treating of farm life and work, but also containing general reflections on domestic virtues, industry, and poetic art. The same writer gives a genealogy of Greek gods and heroes in his "Theogony." Lyric poetry had its rise in the latter part of the first period, and its finest examples are embodied in the writings of the poetess Sappho, and Alcæus, Alcman, and Pindar. The latter was, perhaps, the greatest of all lyric poets, his productions treating of the heroes associated with the Olympian and other festival games. It was the custom in Greece to recite the epics in the family before retiring at night, while the lyrics were sung at the festivals given on state occasions and in the homes of the wealthy classes.

Greek literature is particularly rich in drama and history, and attained its height of importance in the oratory of Attica. In the Golden Age of Greece the literature reflected the political glory and educational importance of the Hellenes. The drama rose as a means to educate the common people in religious duties, but also to instruct them in government and the industries. The dramatical works reached their highest perfection in the Age of Pericles, when vast theaters were built to accommodate large audiences, the largest at Athens. Sophocles, Æschylus, and Euripides are among the best known writers of tragedy, and Aristophanes stands highest among the writers of comedy. Herodotus stands preeminent as the greatest historian of Greece, and to him we are indebted for much of our knowledge of early peoples, including the Chaldæans and Babylonians, and the Persian wars. Other historians of note were Thu-

cydides and Xenophon. The former is best known for his "History of the Peloponnesian War," and the latter by his "Recollections of Socrates" and "Cycropædia," a history of Cyrus the Great.

Socrates stands preëminent among the philosophers, and is closely associated with Plato and Aristotle, these three being the greatest philosophical teachers of antiquity. We are indebted to Plato for a knowledge of the teaching of Socrates, the latter leaving no written works. Plato also is the author of "Dialogues," a work that has exercised marked influence on modern thought. Aristotle wrote on metaphysics, logic, economics, physics, and rhetoric. No less important than Grecian philosophy is the oratory of the Hellenes. To be an orator was not only regarded a high accomplishment, but oratory was taught as a special branch of study, and expert teachers found lucrative employment in writing speeches. Antiphon was the first of the ten great orators, but Demosthenes ranked as the most eminent, and his efforts are taken as the highest perfection in the art. The most noted oration of the former is "On the Murder of Herodes," while the oration of Demosthenes entitled "Oration on the Crown," which was directed against Æschines, and his "Philippics" against Philip of Macedon, were the most effective. Other great orators include Pericles, Lysias, and Isocrates. The three schools of Greece were the Stoics, Epicureans, and Skeptics, with which are associated respectively the names of Zeno, Epicurus, and Pyrrho.

The Alexandrian Age of Greek literature is the last period, being so called from the rise of Alexandria in Egypt, and embracing the epoch from the division of the empire founded by Alexander the Great to the conquest of Greece by the Romans, from 300 to 146 B. C. In this period Greek scholars influenced learning in Egypt, and aided in producing the Septuagint version of the Old Testament, the name applied to the translation from the Hebrew into the Greek made by seventy scholars at Alexandria. Among the writers of this period are Theocritus, author of "Idylls;" Euclid, Archimedes, and Aristarchus, the latter a forerunner of Copernicus. The scientist, Strabo (50 B. C.); the astronomer, Claudius Ptolemy (150 A. D.), and the historian, Plutarch, are among the later writers to enrich the literature. Plutarch, a Greek-Italian writer of the 14th century, had a modifying influence on Greek literature as the author of "Parallel Lives," in which he contrasts many Greek soldiers and statesmen with leaders of Rome. Modern Greece has produced comparatively few great writers, but the improved condition of schools and institutions of higher learning is having a wholesome and elevating effect in literary lines.

GREEK CHURCH, one of the Christian sects, whose official title is Holy Orthodox Catholic and Apostolic Church. Its membership is confined largely to the countries formerly under the Byzantine Empire and in Russia. There are three distinct branches: the Orthodox Church in the Turkish Empire, the Orthodox Church of Russia, and the National Church of Greece. Prior to 1054 the adherents of the Greek Church were a part of the Roman Catholic denomination, but in that year the two branches became separated, largely on account of contentions regarding papal supremacy and vital doctrinal points. The Greek Church of the world at present has a total membership of 98,500,000, of which 80,300,000 are in Russia. The Greek Orthodox Church has 21,500 communicants in the United States, and the Russian Orthodox forty churches and 48,000 members.

GREELEY (gree'lĭ), **Horace**, journalist, born in Amherst, New Hampshire, Feb. 3, 1811; died Nov. 29, 1872. He secured a common school education, learned the printer's art at East Poultney, Vermont, and became assistant editor of the "Northern Spectator." He came to New York City in 1831 with a capital of $10. Shortly after he engaged in printing and in 1834 established "The New Yorker." In 1840 he published the "Log Cabin," a weekly newspaper that attained a circulation of 80,000, and was of material aid to W. H. Harrison in the presidential election of that year. The success of this publication gave him considerable prestige in founding the "New York Tribune" in 1841, which he edited until his death. He was elected a member of congress in 1848, and visited Europe in 1851 on a commission to the Crystal Palace Exposition held in London. During the Civil War he supported the Union, advocated the election of President Lincoln, and, after the surrender of General Lee, favored general amnesty and universal suffrage for the purpose of bringing about a better feeling between the north and south. He went to Richmond in 1867, where he signed a bail bond for Jefferson Davis, an act that met with strong condemnation in the northern states. He was nominated by the liberal republicans and democrats in 1872 for the presidency against General Grant, but met with defeat. The extraordinary strain of the election and the decease of his wife caused an illness, from which he died a few weeks later. Greeley was an able journalist, an influential and popular orator, and a careful student of men. Among his best known writings are

HORACE GREELEY.

"The American Conflict;" "Glances at Europe;" "Recollections of a Busy Life;" "History of the Struggle for Slavery Extinction," and "What I Know About Farming."

GREELY, Adolphus Washington, explorer, born in Newburyport, Mass., March 27, 1844. He graduated at the Brown high school in 1860, served as a volunteer in the Civil War, and at its close entered the regular army as lieutenant. He was assigned to the signal service in 1868, and in 1881 selected to conduct an expedition into the Arctic regions. In 1881 he sailed from St. John's, Newfoundland, and, after three years of endurance and hardships, he and six survivors of his party of twenty-five were rescued at Cape Sabine in 1884, eighteen of his men having died from starvation. In 1887 he was appointed chief of the signal service with the rank of brigadier-general. His work, "Three Years of Arctic Service," contains a full account of the Arctic expedition, and has been translated into French and German. Among his other publications are "American Weather" and "American Explorations and Travelers." Gold medals were given him by geographical societies of London and Paris.

GREEN, John Richard, historian, born in Oxford, England, December, 1837; died in Mentone, France, March 9, 1883. In 1860 he graduated from Cambridge. Shortly after he became curate in London, contributing occasionally to the "Saturday Review." In 1874 he published "The History of the English People" in four volumes, by which he secured a wide reputation. Later he collected a number of essays and published them in 1877 under the title, "Stray Studies," and in 1882 published his work entitled "Making of England." His last great work was "Conquest of England," which appeared shortly before his death. The writings of Green show much imaginative power, deep study of the character of individuals and nations, and extraordinary ability to describe minutely distant scenery. His writings are characteristic in that they show consideration for the common people and their social institutions. The work entitled "The Short History of the English People" had the most extended reading. Within a short time after publication 150,000 copies were sold.

GREEN, Seth, naturalist, born in Rochester, New York, March 19, 1817; died there Aug. 20, 1888. After receiving a common school education, he became interested in the management of a fish and game market and grew fond of hunting and fishing. His attention was attracted to the spawning of the salmon, and he thereby developed a knowledge and interest in the artificial propagation of fish. To overcome the tendency of male salmon to consume the spawn laid by the female, he invented an apparatus to hatch 95 per cent. of the eggs, and by means of it was successful in protecting them. In 1867 he succeeded in hatching 15,000,000 shad at Holyoke, Mass., and also carried on the industry in the Potomac, Hudson, and Susquehanna rivers. Soon after he transported the shad to California, and thereby made the Pacific coast waters exceedingly productive in this class of fish. His inventions for artificial fish culture include about twenty different kinds. He wrote several treatises on pisciculture. Among his publications are "Trout Culture" and "Fish Hatching and Catching." His valuable services rendered in extending knowledge and success in fish culture were recognized by numerous American and foreign societies. In 1868 he was made fish commissioner of New York and later state superintendent of fisheries.

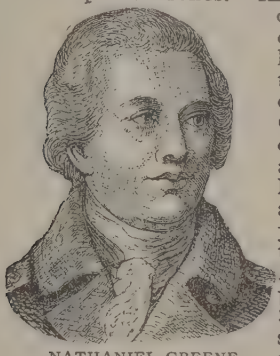
GREENBACK PARTY, a political organization formed in 1876, called by its members the independent national party. It had for its main tenets the repeal of the specie resumption law enacted in 1875, suppression of national bank paper, and the circulation of United States notes. It advocated the freer use of silver money. Peter Cooper, its candidate, received 81,740 votes for president in 1876; J. B. Weaver, 308,578, in 1880; B. F. Butler, 175,375, in 1884, and soon after the party became merged in the people's party.

GREEN BAY, a city in Wisconsin, county seat of Brown county, on Fox River, about 112 miles north of Milwaukee. It has excellently improved streets, electric lights and railways, and is an important railroad and lumber-shipping center. Among its manufactures are flour, clothing, furniture, soap, fermented beverages, cigars, and machinery. The surrounding country is agricultural. Numerous calcic magnesic springs are within a short distance of the city, which have made Green Bay a favorite health resort. The educational institutions are well organized, including several scientific societies. There is a growing trade in merchandise, live-stock, cereals, and dairy products. Population, 1900, 18,684.

GREENBUSH, a town of Rensselaer county, New York, on the Hudson River, opposite Albany. It is the seat of good schools and contains a Roman Catholic convent. Among its industries are saw mills, a tannery, machine shops, freight yards, and pork packing establishments. Population, 1900, 6,755; of this number 2,036 are in East Greenbush, and 4,719 in North Greenbush.

GREENE, Nathaniel, general, born in Warwick, Rhode Island, June 6, 1742; died in Mulberry Grove, Georgia, June 19, 1786. He was brought up as a Friend, became a member of the Rhode Island assembly in 1770, and joined a military company in 1774. The following year he was commissioned brigadier-general and given command of the forces in the vicinity of Boston. On account of distinguished services at Dorchester Heights he was made major-general, and rendered valuable service at Trenton and

Princeton, and also saved the American forces from defeat at Brandywine by skillful and rapid marches. In 1778 he became quartermaster-general, but retained his rank to fight in the field. He succeeded General Gates in command of the southern army in 1780, which he re-organized, and in the same year presided at the trial of Major André. His campaign through South Carolina shortly after was of material value, and he strengthened the American cause by capturing Forts Motte, Watson, and Granby, and also gained victories at Augusta and Eutaw Springs. Congress voted him a medal and title to lands in South Carolina and Georgia, owing to his superior skill and valuable services. As a general and in military maneuvers he was among the most successful of the Revolution, second only to Washington. These two noted generals were firm friends, and were in strict agreement regarding all material points relating to the conduct of the war for independence. After the war he lived in Mulberry Grove, where he died of sunstroke.



NATHANIEL GREENE.

GREENFIELD, county seat of Franklin county, Massachusetts, in the valley of the Green and Connecticut rivers, eighty miles northwest of Boston. It has good railroad facilities. The surrounding country is farming and stock-raising, which makes the town a central shipping point. The manufactures include boots and shoes, machinery, bicycles, and cutlery. There are good schools, a ladies' seminary, and a fine public library. Electric lights, rapid transit, and pavements are among the facilities. Population, 1900, 7,927.

GREENLAND, called Grönland by the Germans and Danes, a large island situated northeast of North America, and separated from the continent by Smith Sound, Baffin Bay, and Davis Strait. The northern portions are unknown, owing to the vast fields of ice common to that region and its extreme severity of climate. All of the interior is uninhabitable, and is characterized by great glacier-sheets of ice, many of which rise to heights approximating 9,000 feet. The average thickness of the ice mass in the northern portion is estimated at 1,000 feet. Great fiords indent the coast and vast icebergs drop into the sea. The estimated area is 46,750 square miles, of which only the southern coast regions are inhabitable. Cultivation is carried on in the valleys of the low shore regions, and several of the many islands lying off the warmer coasts in the southern part. The trees include alder, birch, and pine, but they partake more of the nature of shrubs. Barley and oats have been cultivated to a limited extent, but vegetables, including potatoes, radishes, cabbages, and turnips, are the leading agricultural products. Fishing and hunting are the principal occupations. The fisheries yield whale, halibut, seal, shark, cod, and stock fish, while the chase is rich in ermine, lemming, polar bear, Arctic fox, musk-ox, and Arctic hare. The Eskimo dog and reindeer are the principal domestic animals, but there is a limited production of sheep and cattle. In the summer time sea fowl are abundant, moving from the south to breed in the warmer portions. Many forms of mineral products abound, among them cryolite, lignitic coal, copper, iron, graphite, asbestos, and nickel. The sun is constantly above the horizon in June and July, when the warmer season occurs, but the short summer is followed by a winter dark, long, and dreary.

An Icelander named Gunnbjorn discovered Greenland about 876. In the 10th century Scandinavians from Iceland and Norway made settlements, and in 1264 it was united with Norway for political purposes. The two settlements, known as West Bygd and East Bygd, flourished in the 14th century, but later gradually disappeared. Danish expeditions sent for the inspection of the colonies from 1585 to 1670 were unsuccessful in finding them. The only evidence of their former existence consists of inscriptions and numerous relics. In 1721 the Danes founded a colony, the expedition being led by Hans Egede, and became known as Good Hope Settlement. At present the population consists of 10,850 Eskimos and about 350 Europeans. The island is a Danish colony. It is governed under resident officials from Godhaaf, its local seat of government. The trade is largely with Denmark, the exports consisting principally of whale and seal oil; seal, fox, and reindeer skins; feathers, cryolite, and eiderdown. Nansen crossed the interior from east to west in 1888, which was the first extensive interior expedition.

GREEN MOUNTAINS, a range of the Appalachian system, dividing Vermont into two nearly equal portions. Mansfield is the highest peak, 4,280 feet high, and five others range over 4,000. The mountain sides are covered with fine forests of spruce and other evergreen and deciduous trees. Numerous streams have their sources in the Green Mountains, flowing through fertile valleys. The region was first settled by the patroons and others, and became famous in colonial and Revolutionary history.

GREENOCK (grēn'ǫk), an important seaport of Scotland, in Renfrewshire, on the Firth of Clyde, eighteen miles northwest of Glasgow. It has an excellent harbor, is beautifully located along the coast, and back of it are picturesque cliffs. Among the pub-

lic buildings are several educational institutions, a city hall, and numerous schools and churches. Sugar refining and shipbuilding are the principal industries. Other manufactures include anchors, cordage, steam engines, clothing, textiles, and sails. The prosperity of the city dates from 1707, when its commerce with the West Indies and America became important. Visitors are shown the grave of Burns' "Highland Mary" and places frequented by Watt, who was born there. Population, 64,250.

GREENOUGH (green'o), **Horatio**, sculptor, born in Boston, Mass., Sept. 6, 1805; died in Somerville, Mass., Dec. 18, 1852. He studied at Harvard and in 1825 went to Italy, where he resided the greater portion of his time. The large statue of Washington in front of the capitol of the United States is his principal large work. Other productions include the "Rescue;" "Venus Victri," and "Medora."

GREENOUGH, Richard Saltonstall, sculptor, brother of Horatio, born in Jamaica Plains, Mass., April 27, 1819. He attended the Boston Latin school, studied sculpturing in Paris, and after 1874 resided mostly in Europe. Among his principal productions are the bronze statue of Franklin at city hall square in Boston; "Boy and the Eagle;" "Carthaginian Woman," and a bust of Shakespeare. He died April 24, 1904.

GREENSBORO, a city in North Carolina, county seat of Guilford county, about eighty miles northwest of Raleigh. It is centrally located on several railroads, and has manufactures of clothing, textiles, earthenware, cigars, hosiery, and machinery. There are excellent public schools, and it is also the seat of a state college of agriculture, Bennett College, and Greensboro College. The surrounding country produces large quantities of cereals, live-stock, and fruits, and also contains deposits of iron and copper. Population, 1900, 10,035.

GREENSBURG, a city in Indiana, county seat of Decatur county, forty-five miles southeast of Indianapolis. It is the seat of good public schools, has a fine courthouse, and has a growing market in farm produce and merchandise. There are manufactures of clothing, furniture, flour, carriages, and machinery. The city has good municipal improvements. Population, 1900, 5,034.

GREENVILLE, county seat of Darke county, Ohio, thirty-five miles northwest of Dayton. It is surrounded by a fertile farming country, has extensive railroad connections, and contains several fine buildings. There are manufactures of vehicles, furniture, and machinery. It is a grain-shipping center. A public park, waterworks, and electric lights are among the facilities. Population, 1900, 5,501.

GREENVILLE, a city in Mississippi, county seat of Washington county, on the Mississippi River, about one hundred miles northwest of Jackson. It contains oil mills, cotton compresses, good public schools, and is an important railroad center. Electric lights, waterworks, and telephones are among the improvements. Its annual shipment of cotton is very extensive. Population, 1900, 7,642.

GREENVILLE, a city in Texas, county seat of Hunt county, on a number of important railroads, about eighty miles northeast of Fort Worth. It is surrounded by a fertile region, has a good trade in farm produce and merchandise, and is the seat of good schools. There are manufactures of utensils, cigars, clothing, and machinery. Besides a fine courthouse, it has numerous substantial buildings. Population, 1900, 6,860.

GREENVILLE, a city in South Carolina, county seat of Greenville county, on the Reedy River, forming an important railroad junction. The manufactures include carriages, cotton goods, tobacco, clothing, and machinery. It is the seat of a fine public school system, Furman University, the Greenville Female College, and a theological school. There is a system of street railways, electric lights, waterworks, and pavements. The surrounding country is fertile, producing large quantities of cotton, cereals, fruits, and live-stock. Population, 1900, 11,860.

GREENWICH (grĕn'ĭj), a city of Kent, England, situated on the south side of the Thames, about five miles southeast of London. The most important building is the Greenwich Hospital, founded in 1694 by William and Mary for the care and maintenance of British soldiers, but not completed until eleven years later. Its original cost was $250,000, but subsequently additions were made by which the hospital was enlarged and rendered much more serviceable. The city also contains the Royal Hospital School, a naval museum, the Royal Observatory, and other important institutions of an educational nature. It is connected with London and other centers of population by railroads, electric car lines, and telephones. Longitude is reckoned from Greenwich by English geographers, and it is also made the basis of calculations by American writers in connection with the American basis, which is at Washington. Population, 65,375.

GREENWICH OBSERVATORY, an important institution situated in Greenwich, England, where it was erected in a park containing 190 acres, and designed for the advancement of nautical astronomy and navigation. This institution is one of the oldest and most celebrated observatories in the world, and is equipped with all modern apparatus. From it the exact time is telegraphed to various English cities.

GREGORY (grĕg'ọ-rĭ), the name of sixteen popes, who reigned between 590 and 1846, and among whom are included many of much ability and devotion to the Christian cause. Gregory I., called The Great, a

saint of the Roman Catholic Church, was born in Rome about the middle of the 6th century and died March 12, 604. He descended from an illustrious Roman family. At an early age he became prætor of Rome under favor of Emperor Justin II., and after a brief period entered a monastery. When the conquering armies of Rome brought Anglo-Saxon youths to the slave market, he was imbued with a desire to enter upon a commission with the view of Christianizing their country, and accordingly set out upon that important mission. Soon after he was recalled by Pope Benedict, and later secured an important appointment at Constantinople under Pelagius II. At the death of the latter Gregory was consecrated pope, Sept. 3, 590, in which office he revised the church ritual, advanced organization, Christianized Britain and Spain, and extended the sphere of Christian influence to many countries adjacent to Italy. Pope Gregory was noted for his liberality in bestowing gifts upon the poor, exemplifying Christian virtues, and suppressing the slave trade in many regions. See **Pope**.

GREGORY VII., the most celebrated pope of the Middle Ages, born in Soano, a village in Tuscany, Italy, about 1020; died in Salermo, May 25, 1085. His family name was Hildebrand and he was of German descent, but received his education in a Roman monastery in Italy. He afterward became a monk of Cluny, in France. After entering the court of Henry III. and obtaining a reputation for remarkable eloquence, he returned to Rome and became chaplain to Gregory VI. In 1049 he was made cardinal by Leo IX., and exercised much influence under the German popes, Victor II., Stephen IX., Benedict X., and Alexander II., not only stimulating the government of the church, but developing a theory conducive to the successful reign of the papacy. He was unanimously elected to succeed Alexander II., and received the papal crown on July 10, 1073. His reign was marked by opposition to the system of investiture, and by opposing the removal of several bishops, on account of which he became involved in serious difficulties with Henry IV. of Germany. When that sovereign issued an order removing Gregory from office, the latter excommunicated him, requiring the emperor to undergo severe humiliation before the ban was removed. Later Henry made a second declaration deposing Gregory, appointed Guibert, archbishop of Ravenna, as Pope Clement III., and took forcible possession of Rome in 1084. However, he was afterward driven from the city by an army under command of Robert Guiscord, Norman duke of Apulia. During the severe military contest Rome was put into a state of ruin, on account of which Gregory was compelled to settle in Salermo. Gregory VII. is reputed as a man who loved justice and hated iniquity, but there are evidences that he treated his opponents with severity. The historian Milman regarded him a prolific benefactor of mankind.

GREGORY XIII., Roman pope, born in Bologna, Italy, Jan. 7, 1502; died April 10, 1585. He was educated in Bologna, and, after teaching law there several years, was created cardinal in 1564. In 1572 he was elected pope to succeed Pius V. He became known as a patron of learning and as a student of the sciences. In 1582 he reformed the calendar and prepared the Gregorian, according to which the Gregorian year is reckoned.

GRESHAM (grĕsh'ăm), **Walter Quinton**, soldier, jurist and statesman, born in Harrison county, Indiana, March 17, 1832; died in Washington, D. C., May 28, 1895. After receiving a common school education, he attended the State University of Indiana, was admitted to the bar in 1853, and elected to the state legislature as a Fremont republican in 1860. When the Civil War began, he resigned to accept a commission with the Indiana volunteers. Soon after he was promoted colonel, then brigadier-general, and later major-general. His services were especially gallant at Atlanta, Corinth, and Vicksburg. President Grant appointed him United States judge for the district of Indiana in 1869, which position he resigned in 1882 to enter the cabinet of President Arthur as postmaster-general, in which position he became distinguished as an opponent of the Louisiana Lottery. He became secretary of the treasury in 1884, but resigned soon after to accept the office of United States judge of the seventh circuit, which position he filled with dignity until 1893. In 1892 he supported the democratic party, and was selected the following year by President Cleveland as secretary of state. In this position he showed remarkable traits of statesmanship, particularly in the dispute between Venezuela and Great Britain.

GRETNA GREEN, a village in Dumfriesshire, Scotland, near the head of Solway Firth. It is famous on account of the celebration of irregular marriages. The Scotch law relating to marriage, being more liberal than that of England, caused young couples from the latter country to resort to Gretna Green to take the marriage vows. In the most widespread prevalence of this practice, about 1771, the marriages there often reached 200 per year. The marriage laws were revised in 1856, whereby those contracted at Gretna Green were invalid unless one of the contracting parties had been a resident of Scotland at least twenty-one days previous to the ceremony.

GREUZE (grûz), **Jean Baptiste**, eminent painter, born in Tournus, France, Aug. 21, 1725; died in Paris, March 21, 1805. He studied art at Lyons, and afterward at the Academy in Paris. After producing several excellent works of art, he went to Italy, but returned to Paris in 1757. Among his productions are several Bible scenes and others taken from rural life that have attained a

wide reputation and popularity. Among his most celebrated productions are "Blind Man Cheated;" "Father Explaining the Bible to His Children;" "Girl with Doves;" "The Broken Pitcher," and "Severus Reproaching Caracalla."

GREVY (grā-ve'), **Francois Paul Jules**, president of France, born in Mont-sous-Vaudrey, France, Aug. 15, 1807; died there Sept. 9, 1891. After securing a liberal education, he studied law at Paris, and was admitted as a lawyer in 1837. He became an advocate of republican ideas at an early age. In 1848 he was made a member of the national assembly, and attained a reputation as an orator. When Louis Napoleon became emperor, he devoted himself to the practice of law, and in 1868 was elected to the national assembly, where he developed strength as an opponent to the empire. He was president of the assembly in 1871-73, and again in 1876. Upon the resignation of MacMahon as president in 1879, he was chosen chief executive of the republic for seven years, and was re-elected in 1885. During his long public career he had the implicit confidence of the people, but in 1887 he was charged with partiality in the appointments to office, and, after considerable public discussion, resigned the presidency on Dec. 3, 1887.

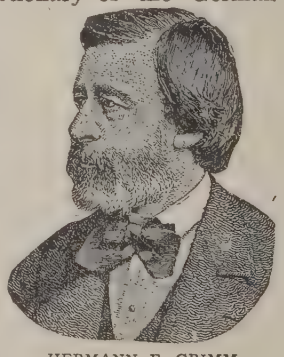
GREY, Lady Jane, queen of England for nine days, born at Broadgate in October, 1537; beheaded on Towerhill, Feb. 12, 1554. Her father was Henry Grey, subsequently duke of Suffolk. She received a liberal education, and when sixteen years of age entered a marriage contract much against her will with Lord Guildford Dudley, fourth son of the duke of Northumberland. The marriage was contracted to secure the succession of the throne to the family of Northumberland, and she became queen July 9, 1553, immediately after the death of Edward VI. Nine days later she was confined as a prisoner in the Tower on a charge of treason, and a death sentence followed four months later. On the scaffold and at all times she declared her innocence of the conspiracy to usurp the throne, and that she had no desire to be queen.

GREYHOUND. See **Dog.**

GRIFFIN, a city in Georgia, county seat of Spalding county, at the junction of several railroads, forty miles south of Atlanta. There are manufactures of furniture, cigars, machinery, canned fruits, and utensils. The surrounding country produces large quantities of cotton, fruits, cereals, and live-stock, thus giving it considerable trade advantages. The city has good school and church buildings, waterworks, electric lights, and other improvements. Population, 1900, 6,857.

GRIMES, James Wilson, statesman, born in Deering, New Hampshire, Oct. 20, 1816; died in Burlington, Iowa, Feb. 7, 1872. He graduated at Dartmouth College in 1836, began the practice of law at Burlington, Iowa, shortly after, and was elected a member of the territorial legislature in 1838 and in 1843. In 1852 he became a member of the state legislature, governor in 1854, and was elected as a republican to the United States senate in 1859. He was reëlected in 1865, but resigned in 1869 owing to failing health. Grimes promoted railroad building, was a mover in the free-soil party, and aided in founding the republican party. He was adversely criticised by his party friends for voting to acquit President Johnson. During his terms in the United States senate he served on several committees, and was among the first to advocate the use of iron-clad vessels.

GRIMM, Jacob Ludwig Karl, scholar and philologist, born in Hanau, Germany, Jan. 4, 1785; died Sept. 20, 1863. He received a liberal education at Marburg, later pursued a select course of study at Paris, and became a profound student of literature. On returning to Germany, he was appointed secretary to the minister of war of Hesse-Cassel, and subsequently librarian and auditor in important places. The elector of Hesse selected him as ambassador, and with him he attended at Paris and Vienna. In 1830 he became professor of German literature at the University of Göttingen, and while there devoted seven years to the study of ancient languages, history, and literature. In 1841 he was made professor at Berlin, was a member of the assembly at Frankfort in 1848, and in the meantime devoted much time and attention to literary work. Among his principal publications are "History of the German Language;" "Origin of Language;" "German Mythology;" "Antiquities of German Laws;" "Nursery and Fireside Stories," and "Dictionary of the German Language." His brother, Wilhelm Karl Grimm, was born in Hanau, Feb. 24, 1786, and died Dec. 16, 1859. He graduated with honors at Marburg University, filled numerous positions of honor, and was professor of philosophy at Göttingen. Later he taught with his brother at Berlin and was also associated with him in many writings. Among his own publications are "Heroic Legends of Germany;" "Poems of the Sixth Century," and "German Runic Characters." The Grimm brothers are among the most eminent writers, philologists, and antiquarians of the German people, and have done for that language what Worcester, Webster, and Johnson did for the English. Their writings have been



HERMANN F. GRIMM.

largely translated and are frequently quoted as authoritative. Hermann Frederick Grimm, son of Wilhelm Karl Grimm, born in Cassel, Germany, Jan. 6, 1828, is a noted author and dramatist. He was educated in Berlin and Bonn. His works include "Arminius;" "Life of Michael Angelo;" "Dreams and Awakenings," and "Uncontrollable Powers." He died June 16, 1901.

GRINDING, the operation of breaking and reducing to fine particles by friction or attrition. The process is used in various mechanical arts, such as grinding corn and wheat, and fitting for use various metals and stones. In grinding glass into facets it is generally customary to use stone lap-wheels, while in grinding needles and steel pins a process called dry grinding, which is effected by dry grindstones, is employed. Diamond dust is used in grinding diamonds and other precious stones. Grinding is employed variously, depending upon the material to be affected by friction. The mechanical implements used are variously constructed and propelled either by hand, steam, or electric power.

GRINDSTONE (grīnd'stōn), a sandstone disc, more or less circular, used for abrading hard substances. A horizontal axle rests upon a support on either side of the stone. The stone, in its simplest form, is rotated by means of a handle or a foot treadle, while in machine shops or factories grindstones are turned by belts or some other appliances. Grindstones are used extensively for sharpening many kinds of edged articles and in smoothing and polishing rough surfaces.

GRISI (gree'see), **Giulia**, noted singer, born in Milan, Italy, May 22, 1812; died in Berlin, Germany, May 29, 1869. She studied at Milan and Bologna, and made her first appearance in 1827. In 1828 she took part as Emma in Rossini's "Zelmira" at Bologna, where she met with an enthusiastic reception. In 1854 she and her husband, Signor Mario, visited the United States, and later she appeared in England, Germany, France, and other European countries. The rare melody and sweetness of her voice won distinction and admiration, while her personal grace and beauty caused the public to admire her in expressions of delight. Heine and several other masters wrote of her with expressions of approval. Among her favorite roles were Emma in "Zelmira;" Norma; Don Pasquale, and I Puritani.

GRISTLE (grĭs''l). See **Cartilage.**

GRISWOLD (grĭz'wuld), **Rufus Wilmot**, author, born in Benson, Vermont, Feb. 15, 1815; died in New York City, Aug. 27, 1857. After securing a general education, he traveled in the United States and Europe, but later became printer, journalist, and Baptist minister. Besides being one of the editors of the works of Edgar A. Poe, he wrote "Poets and Poetry of America;" "Female Poetry of America;" "Curiosities of American Literature;" "Washington and the Generals of the Revolution," and "Sacred Poets of England and America."

GRONINGEN (ĸrō'nĭng-ĸen), an important city of Holland, capital of a province of the same name, on the Hunse River, ninety-two miles northeast of Amsterdam. It is connected by several railroads, has canal facilities through the Hunse River, by means of which large vessels reach the city. Among the important buildings are a beautiful Gothic church with a tower 345 feet high, a university founded in 1640, and several government buildings. There are numerous street car lines, several botanic gardens, an important library, and a splendid public park. Among the manufactures are ships, soap, white lead, paper, clothing, furniture, and machinery. Extensive dikes protect it against the encroachments of the sea, while substantial fortifications make it an important strategic point. Population, 68,130.

GROTE (grōt), **George**, historian and philosopher, born in Kent, England, Nov. 17, 1794; died June 18, 1871. He was educated at the Charterhouse school, entered his father's bank at sixteen, but during leisure hours devoted himself to diligent study of literature and history. He began early to collect material for a history of Greece, and in 1832 completed several able productions on parliamentary reform. In the same year he entered parliament as a liberal in politics. His career as a legislator was distinguished by speeches delivered with much effect, and particularly by his advocacy of voting by ballot. He was twice reëlected to parliament, and in 1843 retired from the banking house for the purpose of devoting himself to his "History of Greece." This work consists of twelve volumes, the first two volumes appearing in 1846 and the last in 1856. The enthusiastic reception given to this production led him to publish a work on Plato in 1865. Later he began a work on the life of Aristotle, but did not succeed in completing it, though the portion completed was published after his death. He was president of University College and vice-chancellor of London University for many years, and spent much time in the management of these institutions. Grote was a man of liberal opinions and studious research. His work on history takes high rank on account of its strong points in philosophy, logic, and general accuracy.

GROTIUS (gro'shĭ-ŭs), or **De Groot, Hugo**, scholar and historian, born in Delft, Holland, April 10, 1583; died in Rostock, Aug. 28, 1645. He descended from influential ancestors, was educated at the University of Leyden, and after receiving a degree accompanied Olden Barneveldt on an embassy to France, where he made the friendship of Henry IV. After practicing law in his native country, he secured a government appointment at Rotterdam in 1613, and later went to Sweden, where Queen Christina appointed him ambassador to France in

1635, which position he held ten years. His writings are largely historical and political, the most important being devoted to fundamental principles of international law. This work is entitled "De Jure Belli et Pacis."

GROUCHY (groo-she'), **Emmanuel, Marquis of**, general, born in Paris, France, Oct. 23, 1766; died in St. Etienne, May 29, 1847. At the age of fourteen years he entered the army. When the Revolution broke out he was made colonel of cavalry, and distinguished himself by assisting in suppressing the revolt in La Vendée. In 1798 he fought under Moreau in Italy, where he was taken prisoner, but was exchanged the following year. Shortly after he fought successfully at Hohenlinden, Eylau, Friedland, and Wagram, and was in command of Napoleon's bodyguard from Moscow. After the return of Napoleon from Elba, he was made marshal of France, in which position he defeated Blücher at Ligny. He was criticised for complying strictly with the orders of Napoleon directing him not to march to Waterloo, by which he was held indirectly responsible for Napoleon's defeat. He was banished after Napoleon's second abdication, came to America, and for six years resided in Philadelphia. A royal ordinance in 1821 permitted his return to France, and in 1832 he was created peer with the title of marshal.

GROUSE, the common name of various game birds abundant in the northern sections of both hemispheres, and distinguished

AMERICAN PINNATED GROUSE.

by a naked band in place of an eyebrow. They are characterized by their plump bodies, and the feet, legs, and nostrils being covered more or less with feathers. In many species a loose, bare sac is suspended on each side of the neck. They are the most delicate game-birds that come to the table. Among the different species are found the ptarmigan, red grouse, ruffed grouse, pinnated grouse, and sage-hen. To the same family belong the quail and various domestic fowls, including the cock and hen, turkey, guinea-fowl, and peacock. The ptarmigan is a species native to the Arctic regions, whose plumage in winter is snow-white. It somewhat resembles the red grouse, sometimes called the European ptarmigan, which is found in Scotland and does not turn white in winter. The ruffed grouse is common to America. It is known in the eastern states as pheasant, farther west as partridge, and in the western states by its proper name—grouse. This species prefers to frequent timber and brushy lands, is shy and quick in movement, and the color is closely adapted to the gray of the underbrush. A distinguishing habit of the male is a drumming sound, made while standing on a log, by strokes of the wings upon the wood with such rapidity and strength as to be heard at a considerable distance. Several species closely allied to the ruffed grouse are found in Eurasia, but do not drum. The pinnated grouse, or prairie chicken, inhabits the central and western plains, and is protected by the laws of the states, except for a short period in the fall of the year. The oom-oom-boo produced by the male in the breeding season is well known to hunters, and is made by means of the large, orange-like sacs on its neck. These sacs are covered with long, wing-like tufts of feathers, which, when booming, stand up like ears, giving it a peculiar appearance. In size the prairie chicken is equal to the common hen, and has a speckled-grayish color. The sage-hen is the largest American grouse, and is found principally west of the Rocky Mountains. It lives on wild sage, which renders it inferior for food to other members of the grouse family.

GROW, Galusha A., lawyer and statesman, born in Ashford, Conn., Aug. 31, 1824. In 1844 he graduated at Amherst College, was admitted to the bar in 1847, and in 1851 became a member of congress from Pennsylvania, serving twelve years successively. Though elected as a democrat, he severed his connection with that party in 1854 on the repeal of the Missouri Compromise. He was speaker of the house in 1861-63, and served as a delegate to the national conventions held by the republicans in 1864 and 1868. In 1900 he was elected congressman-at-large from Pennsylvania. He entered the house of representatives as the youngest member in 1851, when Clay was in the senate and Webster secretary of state. He was long "Father of the House," a term applied to the member having served longest, or a greater period than any other congressman.

GUADALAJARA (gwä-dä-lä-hä-rä), an important city in Mexico, capital of the state of Jalisco, and second city of the republic. It is situated in the fertile valley of the Rio de Santiago, about 280 miles from the city of Mexico, and ranks as an important manufacturing and commercial center. The streets are regularly platted, municipal facilities modern, and the most important buildings include a government mint, cathedral,

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PRAIRIE HEN.

Tympanuchus americanus.

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several convents, and an important university. Among the manufactures are pottery, paper, jewelry, cotton and woolen goods, leather, and machinery. There are good railroad and electric railway facilities. Population, 95,768.

GUADALQUIVIR (gwä-däl-kĕ-vēr′), the largest and most important river of Spain, rises near the frontiers of Murcia. It has a general course toward the southwest, flowing into the Atlantic north of Cadiz. Its length is 375 miles, of which eighty-five miles, or to the city of Seville, are navigable by large vessels. It has been improved by canals and jetties, and is noted for its production of fish.

GUADELOUPE (gą-da-lōōp′), a colonial possession of France in the Lesser Antilles, consisting of two islands, Grand-Terre and Basse-Terre, which are separated by a narrow channel called Riviere Salee, meaning Salt River. The colony, together with five small dependent islands, has an area of 685 square miles, with a population of 169,980. Basse-Terre is the larger of the two main islands, having a length of twenty-seven miles and a breadth of fifteen miles; while Grand-Terre is twenty-nine miles long and about ten miles wide. The islands are of volcanic formation, but in several regions of the group are large tracts constructed by corals. Columbus discovered these islands in 1493. They were colonized by the French in 1635. The climate is marked by a humid atmosphere, generally hot and unhealthful, and the soil is fertile. Among the principal exports are tobacco, sugar, coffee, pepper, dye and cabinet woods, cacao, and a large variety of tropical fruits. The imports consist of machinery, fabrics, and various implements. Most of the trade is with France. In 1897 the islands were disturbed by destructive earthquakes and in 1899 by a disastrous hurricane. A senator and two deputies represent the colony in the chambers at Paris.

GUADIANA (gwä-dē-ä′nä), a river of the Iberian peninsula. It rises in New Castile, Spain, has a general course toward the west until it enters Portugal at Monsaras, and thence flows south into the Atlantic. Its entire course is 400 miles, but the navigable portion is only about forty miles.

GUAM, the largest and most southerly of the Ladrone Islands, a group of about fifteen islands discovered in 1521 by Magellan. It is situated 1,500 miles east of Luzon, in the Philippines, and 5,000 miles west of San Francisco. Guam is thirty miles long, from two to twelve wide, and has an area of 150 square miles. In 1900 it had a population of 8,661, consisting mostly of natives. It was captured by the United States in 1898. By the terms of the treaty of peace with Spain at Paris it was made a colonial possession, and is used principally as a naval station. It is important mainly on account of its harbor at Apra and convenience as a recoaling place in mid-ocean. Agana, the capital, is a fortified town of 5,249 inhabitants. Schools have been established for the education of the natives, while polygamy and slavery have been suppressed. Much of the soil is quite fertile. The principal products consist of copra, sugar, rice, oranges, lemons, cocoanuts, and vegetables.

GUANABACOA (gwä-nä-bä-kō′ä), an important suburban town of Cuba, situated about four miles from Havana, with which it has railroad and telephone connections. It is noted for its beautiful gardens, parks, and hot and cold baths for invalids. The streets are regularly platted, and many of its buildings are of good material and on modern plans. Population, 13,965.

GUANAJUATO (gwä-nä-ʜwä′tō), an important city of southern Mexico, capital of the state of Guanajuato, situated among mountain ranges 6,780 feet above sea-level. Its streets are irregular, but many of the buildings are substantial and modern. It is connected with other cities by railroads, surrounded by one of the richest mineral countries in the world, and has manufactures of implements, clothing, machinery, jewelry, and fabrics. There are several public schools, convents, and churches. Population, 58,640.

GUANO (gwä′nō), the decomposed excrement of fish-eating sea-birds, intermixed with the remains of seals and sea-fowls. It has accumulated to the depth of eighty to a hundred feet on the Chincha Islands and the coasts of Peru and Chile. For centuries innumerable flocks of sea-birds have bred and roosted on these shores, thus causing the deposits. Its value for fertilizing has been utilized in Peru for centuries, but not until 1846 was it transported to other countries as a commercial fertilizer. Eight million tons were taken from the Chincha Islands in 1853-72. Guano contains nearly all the inorganic matter required by plants and, therefore, is one of the best fertilizing agents for the different crops. It has been found in greater or less quantities in various places, but Peru still remains the chief source of supply. However, the available quantity there and elsewhere is becoming considerably limited. The Chilean government has control of the business, which for a number of years has proved a lucrative enterprise. The principal supply of guano used in the United States is now produced at slaughter-houses from refuse flesh and blood, called flesh guano and blood guano, and at the fisheries from refuse of edible fish or from undesirable varieties. The menhaden fish are utilized largely for this purpose, though the oil is extracted before the fish are converted into fertilizer.

GUAPORE (gwä-pō′rā), or **Itenez**, a navigable river of South America, which at its confluence with the Mamore forms the Madeira. It rises in the province of Matto Grasso, Brazil, forms a portion of the

boundary between Brazil and Bolivia, and has a total length of 400 miles.

GUATEMALA (gwä-tē-mä'lä), the most northwesterly republic of Central America, bounded on the west and north by Mexico; east by British Honduras, the Gulf of Honduras, Honduras, and Salvador; and south largely by the Pacific Ocean. The country is divided for government purposes into twenty-two departments. It has an area of 48,225 square miles and a population of 1,658,632. The surface is largely mountainous and elevated, the principal mountain chains being a continuation of the Andes. They trend from northwest to southeast, sending off a number of irregular branches. Among the mountains are numerous volcanoes, of which several are active, the most noted being Fuego, 12,075 feet high, and Agua, 14,875 feet. The drainage is in various directions, though mostly east and north. Among the important rivers are Belize, Dulce, and Malagua, which flow into the Gulf of Honduras, and several tributaries of the Usumasinta, a river system whose waters flow into the Gulf of Campeche.

The fertile and productive districts are largely in the valleys and along the coast, where diversified farming is carried on successfully and forms the principal occupation. Among the products are tobacco, cacao, maize, wheat, coffee, and many varieties of tropical fruits. The forests are abundant, yielding quantities of valuable building material, rubber, and fiber products. The minerals are numerous and occur in rich deposits, though mining has not yet developed extensively. Among the principal products are sulphur, tin, lead, salt, copper, silver, and gold. Manufacturing has received encouragement from the government, especially the rubber industry. There are also productions of cotton and woolen goods, ironware, earthenware, sugar, cordage, furniture, beverages, and utensils. Much of the traffic formerly carried on by pack mules is being brought to seacoast points by railroads. The principal railroad line connects Santo Tomas, on the Bay of Honduras, with San Jose, on the Pacific, passing through the capital city, and being connected by branch lines in various directions. The highways are generally good, while several canals have been cut for the improvement of river navigation.

The government of Guatemala is republican in form, of which a president is the chief executive, holding office for six years. He is assisted by a cabinet of advisers, who include the heads of the departments of foreign affairs, justice, war, public credit, and public instruction. The national assembly is the chief legislative body, the members of which hold office four years and are elected by popular vote. A supreme court and a well organized system of inferior courts constitute the judicial branch. The army consists of 50,000 men, but the standing army disciplined for immediate service includes only 7,000. Roman Catholic is the dominant religion, but all forms of religious worship are unrestricted and no state church exists. Education is free and school attendance compulsory. The school system includes elementary, and high schools, normal schools, industrial schools, and several universities. There are seventy-five periodicals, of which fifteen are dailies, forty weeklies, and others at different intervals. The people embrace about one-third Europeans and various classes of mixed descent, while the Indian races include Aztecs, Mayas, and Toltecs. Spanish is the official language, though some of the natives retain their own distinct tongues, which are fast giving way to the general language under a system of public education.

The history of Guatemala dates from 1524, when it was conquered by Cortez. After three centuries of Spanish dominion the country declared its independence, and a confederation was formed in 1821, which administered the government successfully for eighteen years. Rafael Carrera, a native Indian, conquered the country in 1839 and ruled until 1865. After his death the country was organized under a constitution modeled after that of the United States, and from that time dates its greatest progress and prosperity. Insurrections have occurred at various times, but they have been successfully suppressed and the republic maintained. At present the government supports an adequate postoffice system and is supervising the telephone, telegraph, and railroad lines. The country is one of the most important of Central America, viewed from the standpoint of its government, public improvements, and the rise of cities. Guatemala, the capital, is situated about eighty miles from the Pacific. Other important cities include Coban, Mamastenango, Quezaltenango, San Marcos, Santo Tomas, Totonicapan, and Zacapa.

GUATEMALA, an important city of Central America, capital of the republic of Guatemala, about eighty miles east of the Pacific, on an elevation 4,975 feet above sea-level. It contains several excellent government buildings, a fine cathedral, university, archbishop's palace, and numerous modern municipal facilities. Among its manufactures are pottery, woolen and cotton textiles, machinery, utensils, cigars, spirituous beverages, embroidery, furniture, and jewelry. In 1774 it became the capital, at which time Old Guatemala, situated some distance to the southeast, was destroyed by an earthquake. There are important railroad connections with the coast, both east and west, and with many interior towns. Its public school system is well organized and numerous periodicals and scientific societies are maintained. Population, 75,133.

GUAYAQUIL (gwī-ä-kēl'), a seaport city of Ecuador, capital of the province of

Guayas, on the Guayaquil River, about forty miles from the Gulf of Guayaquil. The site is on low and moist ground, on account of which fevers are common. It is the seat of a national university, several hospitals, the government buildings, and a number of churches. There is an important harbor on the river, which is two miles wide at that point, and it has extensive railroad connections with interior mining and trading centers. As a port city it is one of the best on the west coast of South America, the principal exports being coffee, cacao, fruits, timber, nuts, india-rubber, and mineral products. It has a considerable trade in ivory, live-stock, tobacco, and drug materials. A waterworks system and tramway are among the municipal improvements. In 1896 damage to the amount of $30,000,000 was done by fire. Severe disturbances by earthquake shocks have also destroyed portions of the city at various times. Population, 50,975.

GUELPH (gwĕlf), county seat of Wellington county, in the province of Ontario, Canada. It is situated in a fertile country and has connections by important railroads. Among the manufactures are flour, woolen goods, sewing machines, farming implements, furniture, musical instruments, soap, and shoes. It is the seat of a good public school system, and near it is the Ontario Agricultural College. Population, 12,250.

GUELPHS AND GHIBELLINES (gĭb'ĕl-lĭns), the names of two important political parties that contended for supremacy in Germany and Italy from the 11th to the 14th centuries. The party names originated from two families known as the Waiblingen and Welf, who were rival parties in the German Empire, the latter being still represented in the ruling house of England. These names sprang into existence from the battle of Weinsberg, which occurred between Emperor Conrad of Hohenstaufen and Welf in 1140. The Welfs became known as Guelphs, receiving their chief support in the Italian cities of Bologna, Florence, Vienna, Modena, and Milan; while the Waiblingens took on the name of Ghibellines and were supported principally by the cities of Lucca, Pisa, and Arezzo. During the conflicts many of the cities and communities changed in accord with the interests peculiar to different localities. In the main the Ghibellines supported the imperial authority of Italy, while the Guelphs were in opposition. Toward the latter part of the 13th century the bitter feuds partook more of the nature of a personal warfare. After the 14th century both parties disappeared from history.

GUIANA (gē ä'nä), an extensive region lying between the Amazon and Orinoco rivers, South America. It is properly divided into five divisions: Portuguese Guiana, now united with Brazil; Spanish Guiana, now connected with Venezuela; and the three European colonies of Dutch, British, and French Guiana. The entire territory has a length of 1,200 miles from east to west, and a breadth of 800 miles, including an area of 690,000 square miles. However, the portions united with Venezuela and Brazil have largely lost their identity, and in modern geographies the name is applied only to the European colonies. These colonies are enclosed by Brazil, Venezuela, and the Atlantic Ocean. Europeans first explored Guiana in 1499, but settlements were not made until 1613, when the Dutch established themselves at Essequibo. The English founded a colony at Surinam in 1650, and in 1664 the French settled at Oyapock. Following these settlements numerous conflicting claims arose, which were marked by various contests until 1803, when the history of British Guiana begins and the various possessions assumed their present form. The coast regions and valleys are exceedingly fertile, and the chief wealth consists of its exhaustless soil and tropical products. As a whole the climate is moist and hot; the rainfall averages fom seventy to one hundred inches, and the temperature varies from 75° to 90° Fahr. There are many navigable rivers, splendid tracts of forest, and rich deposits of gold, silver, iron, and other minerals, especially in the southern region of the country.

British Guiana, or Demerara, is bounded on the north by the Atlantic Ocean, east by Dutch Guiana, and south and west by Brazil and Venezuela. The area, including a portion claimed by Venezuela, is about 98,500 square miles, and has a population of 286,500, a large per cent. of whom are native Indians and people of African descent. Ranges of mountains belonging to the Parima system trend on the eastern boundary, and the Acarai on the southern. The principal rivers include the Essequibo, Gayuwini, Berbice, and the Corentyn on the eastern boundary. The principal products include live-stock, tobacco, coffee, maize, indigo, rice, butter, sugar, fruits, and cereals. Gold and silver are mined in the mountain districts on the south and east. The forests are luxuriant and yield large quantities of valuable timber. There are exports of fish, rice, timber, vegetables, and fruits. Several railroads and numerous telephone lines have been built, connecting the seacoast towns with the interior. The government is administered by resident officials appointed by the crown, and numerous schools, colleges, and educational institutions have been established. Georgetown is the capital and principal seaport. Other thriving cities are Hope Town and Amsterdam.

Dutch Guiana, or Surinam, a colonial possession of Holland, is situated between French and British Guiana. It has a seacoast of 240 miles and an area of 46,060 square miles. The population is 75,000; the capital is Paramaribo, and the government is administered

through a resident governor, council, and the colonial legislature. All the coast region and many extensive valleys are highly fertile, while ranges of the Acarai Mountains yield large quantities of gold, silver, coal, petroleum, and other minerals. There are productions of sugar, cacao, lumber, livestock, cereals, tobacco, rice, and tropical fruits. Numerous connections have been made by means of telephone, telegraph, and railroads, and schools and institutions of higher learning are maintained by government grants and taxation. The principal rivers include the Corentyn on the western boundary, Maroni on the eastern boundary, and the Carapion, Surinam, and Coppename flowing through the interior. Its exports and imports are about equal, and the productive resources are developing rapidly. The population includes many Europeans, but it is made up chiefly of Negroes and Indians. Religious liberty is granted to all classes. The slave trade was prohibited in 1863.

French Guiana, or Cayenne, a colonial possession of France, is located between the Atlantic Ocean and Dutch Guiana. The surface is largely level, though there are several ranges of mountains in the southern part. Besides the Maroni River on the western boundary, there are a number of smaller streams, among them the Sinamari and Aprouague. The total area is 46,697 square miles; population, 30,500. Cayenne, a city of 12,000 inhabitants, is the capital. The climate is exceedingly moist and unhealthful. There are productions of pepper, cloves, nutmegs, cinnamon, fruits, timber, cereals, gold, live-stock, and asphalt. The colony has not been materially prosperous, owing to its unhealthful climate. From 1853 to 1864 it formed a penal colony of France, but since the latter date no convicts have been transported there. The city of Cayenne contains about one-third of the population of the entire possession. It has been improved by public works and is the seat of a good public school system. Besides containing several government buildings, it is the seat of the Royal Astronomical Society's station.

GUIDO RENI (gwee'do rā'nee), painter of the Bolognese school, born near Bologna, Italy, Nov. 4, 1575; died there Aug. 18, 1642. After studying under Denys Calvaert, he entered the school of Ludovico Caracci at the age of twenty, and early developed much skill as a painter and designer. Many of his productions are still admired in the principal galleries of Europe. His first work on which his reputation is based is the "Coronation of the Virgin." Other celebrated productions include "Michael Vanquishing Satan;" "Aurora and the Hours;" "Lot and his Daughters," and "Magdalena."

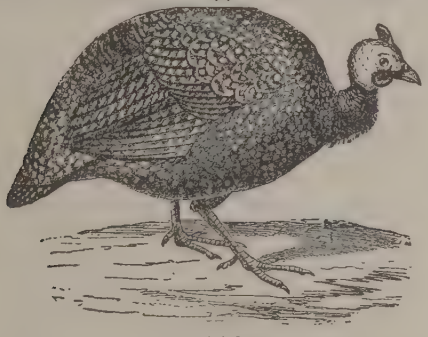
GUILD (gild), the name of various associations that flourished in the Middle Ages, being designed to further commerce, handicrafts, and various business enterprises. These associations were advantageous in obtaining municipal and civil liberty as against oppression by the nobles, and for mutual development and protection in the industrial arts. The German guilds of craftsmen attained the height of their influence in the 13th century, when they were empowered to defend their interests by force of arms, but a decree issued in 1240 by Emperor Frederick II. restricted them in various respects with the intention of destroying further growth in political power. This decree and others issued subsequently were inoperative, and the guilds remained influential in Germany until the beginning of the 19th century, when the practice of all trades became unrestricted in all German states. Austria established freedom of the trades in 1860. The guilds secured a foothold in England early in the 7th century, remaining powerful factors in the trades and arts until Henry VIII. issued a decree confiscating their property. However, they were maintained in a general way until 1835, when every form of restriction on the trades and arts was abolished, and since then various corporations have succeeded them. France and other European countries as early as 1739 took like steps for the purpose of giving all parties freedom of choice in the pursuits of trades and business enterprises. At present trades-unions take the place of guilds in the matter of protecting the interest of workingmen, but they do not restrict in the selection of a business or occupation.

GUILLOTINE (gĭl'lō-tēn), an apparatus named from its inventor, Joseph Ignace Guillotin (1738-1814), and used by the French government for executing criminals. A similar invention for beheading was used in the Middle Ages, but the form adopted by the convention at the time of the French revolution contained a number of improvements. A highwayman was executed on April 25, 1792, at the Place de Grede, Paris, being the first to be guillotined. The construction consists of two posts placed upright on a platform about twelve feet square, between which an ax is suspended. In the ordinary guillotine the ax is formed much like a hay-knife, running in grooves between the posts, where it is suspended by a loop in the halyards, and held in place by a button at the top. The person to be executed is bound to the platform, and the knife is dropped upon his neck by its own weight, which is sufficient to cause the head to be severed from the body. The Persians and Italians used a similar instrument for beheading criminals, and one called the maiden was employed in Scotland in the 16th and 17th centuries. It is commonly supposed that the inventor perished by the machine of his own invention, but this is erroneous, since he founded the academy of medicine after the guillotine was abolished, and lived until 1814. The name is also

applied to a machine for cutting straw, paper, and other substances.

GUINEA (gĭn′ē), **Gulf of**, the name applied to a large portion of the Atlantic Ocean, on the west coast of Africa, washing the shore between Cape Lopez and Cape Palmas. The Bights of Biafra and Benin are within the gulf. It receives the waters of the Niger and contains the islands of St. Thomas, Fernando Po, and Princes.

GUINEA-FOWL, or **Pintado**, a genus of birds of the turkey family, belonging to the genus numida, native to western Africa. There are several species, the best known being the common guinea-fowl, which has been domesticated and is reared extensively. It is about the size of a common fowl, has a quarrelsome disposition, a peculiar harsh cry, and seeks to tyrannize other poultry. The varieties usually grown in the United States are shy, have slate-colored



GUINEA-FOWL.

plumage with speckled feathers alternating, naked head, and small eggs with strong shells. The eggs are esteemed for food. Usually the guinea-fowl is kept partly as a barnyard ornament, and because of its tendency to defend other fowls against their enemies. In the West Indies they are met with in flocks in a wild state, and are seen frequently in numbers ranging from twenty-five to fifty. Some species of Africa and Asia have a pure white plumage. In the time of Roman prosperity the guinea-fowl was a favorite of the chase, and its flesh was highly esteemed.

GUINEA-PIG, a class of rodent mammals native to South America, but domesticated and grown extensively as pets. There are several varieties, most of which are white, reddish, or white-and-black spotted. They are very small, about twelve inches long, and resemble the pig only in their grunting voice. Among the common characteristics are short and rounded ears, timid habits, no tail, and low degree of intelligence. In South America they occur in large numbers on the banks of the La Plata, in Brazil, Bolivia, and other countries. They most commonly frequent the forests during the daytime in a secluded manner, and come out in the evening for food. Their stupidity makes them an easy prey to various serpents and flesh-eating animals, though their loss by destruction in this manner is at least partly overcome by their rapidity in multi-

GUINEA-PIG.

plying. They begin to bear young, when only two months old, produce from one to five at a birth, and from three to six litters each year.

GUISCARD (gēs-kar′), **Robert**, duke of Apulia and Calabria, sixth son of Tancred de Hauteville, born in Normandy, France, about 1015; died in Cephalonia, July 17, 1085. His eldest brother, William, succeeded in gaining possession of Apulia during the wars of Italy, and at his death Robert was proclaimed count of Apulia. By skillful management he succeeded in conquering Calabria, his possession of the same being confirmed by Pope Nicholas II. Subsequently he defeated the Saracens in Italy and Sicily, and dispatched his son, Bohemond, to undertake the conquest of Corfu, while by his own hasty movement he defeated Alexius Comnenus, emperor of Greece, at Durazzo in 1081. His next movement was to undertake the capture of Constantinople, but, owing to an invasion of Italy by Henry IV. of Germany, he hastened to repel the invader, and was successful in liberating the pope from a siege at St. Angelo in 1084. Subsequently Guiscard defeated the Greeks in Epirus and conquered a number of the islands of the Archipelago, but died suddenly while on his way to Constantinople. Guiscard was a patron of learning as well as a brave and heroic conqueror.

GUISE (gwēz), a ducal family of France, and a distinguished branch of the house of Lorraine. It was named from the town of Guise in the department of Aisne, France, where it was founded by Claude, son of René II., duke of Lorraine, who became naturalized in France in 1506. The family continued to exercise influence in the history of France for two centuries. The best known of the Guises is Henry I. of Lorraine, third duke of Guise, born Dec. 31, 1550; assassinated at Blois, Dec. 23, 1588. He became embittered against the Protestants on account of the murder of his father, and turned in opposition to them with a spirit of revenge. In 1569 he forced Coligny to discontinue the siege of Poitiers, and on Aug. 24, 1572, took part in the massacre of St.

Bartholomew at Paris, where he witnessed the dead body of Coligny. Afterward he conquered Henry of Navarre, which caused the people to favor him in his ambition to become king, but he was soon after assassinated by agents employed through the influence of Henry III.

GUITAR (gĭ-tär'), a stringed musical instrument having a hollow body somewhat resembling the violin, and played by plucking or twitching the string with the right hand, while the left is used to form notes by pressing the strings against the frets on the finger-board. It is used principally to accompany the voice in singing. The Moors introduced it into Spain, where it has remained a popular instrument ever since. Those of modern manufacture have six strings. The three lowest strings are made of silk, covered with a fine wire, and the three highest of gut. At present it is used extensively in all civilized countries.

GUITEAU, Charles Jules, assassin of President Garfield, born in Freeport, Ill., Sept. 8, 1841; executed in Washington, D. C., June 30, 1882. After being admitted to the bar, he failed in securing a sufficient practice, published circulars of an erratic character on various moral questions, and was divorced from his wife. Later he sought to make his living by lecturing. The Oneida Community of New York expelled him. After the election of President Garfield, he applied for a consular position, and, owing to a failure in securing the appointment, he shot the president on July 2, 1881. When brought to trial, he entered the plea of insanity, but his record and conduct failed to prove him insane.

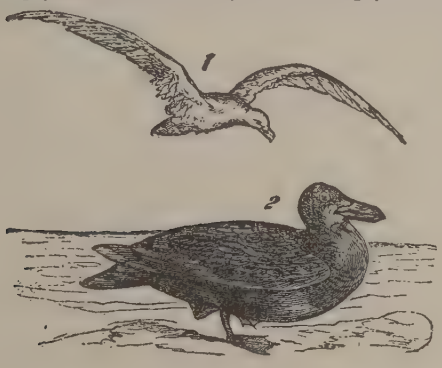
GUIZOT (gē-zo'), **Francois Pierre Guillaume,** historian and statesman, born in Nimes, France, Oct. 4, 1787; died Sept. 12, 1874. He descended from a distinguished Huguenot family, and, after his father was guillotined in 1794, was taken to Geneva, Switzerland, by his mother and carefully educated. In 1805 he returned to Paris to pursue a course in law, but soon became interested in literature and art. His first publications to attract attention were his review of Chateaubriand's "Martyrs" in 1809, and a new dictionary of synonyms. In 1812 he published a translation of Gibbon's "Decline and Fall of the Roman Empire," and the same year married Mlle. de Meulan, editor of the "Publiciste System." His next recognition came in the form of an appointment as professor of history at the University of France. After the fall of Napoleon, in 1814, he secured several public positions, among them secretary-general of the ministry of the interior, later secretary-general of the minister of justice, and director-general and counselor of state in 1816. With the ascendancy of the ultra-royalists in 1820 he was deprived of public office, and began to devote his time to writing his "History of France," which appeared in thirty-one volumes, and about the same time his work of twenty-six volumes, entitled "History of the Revolution in England," appeared. In 1829 he again became counselor of state, and shortly after appeared his lectures, now published under the title, "Course of Modern History," a production that placed him in high repute as a modern historian. Shortly after he became minister of public instruction, in which position he rendered valuable services in the educational affairs of France by numerous lectures and by publishing courses of study. In 1840 he was appointed ambassador to England. Later he was prime minister of France. The latter position he continued to fill until in 1848, when Louis Philippe fell and he fled to England for safety. Shortly after he returned to Normandy, where he devoted himself to history and literature. Guizot was a Protestant in religion. He was married three times, his first two wives being accomplished literary women. His son, Maurice Guillaume, also attained to a literary reputation.

GULF STREAM, one of the most extensive and best known of the oceanic currents, receiving its name from the Gulf of Mexico. All the currents of the ocean are so nearly continuous that they in fact resemble one vast movement. Any given current in the ocean is influenced more or less by the movement of all other oceanic streams. The winds and differences in the density of oceanic waters cause large volumes to pass from near the equator into the Caribbean Sea, thence through the Yucatan Channel into the Gulf of Mexico, whence it is known as the Gulf Stream, a name applied until it finally disappears as a distinct current, after passing across the Atlantic. In the Gulf of Mexico it has a temperature of about 50° Fahr., flows as a definite warm current through the Straits of Florida, courses in a northeasterly direction a short distance from the coast of the United States, and has a width varying from fifty to 300 miles. In the Straits of Florida its velocity is about six miles per hour, whence it gradually diminishes, being about four miles per day at its greatest width in the Atlantic. The coast of Europe divides it into two parts, one passing southward along the coast of Spain and to the northeastern part of Africa, and the other flowing to the Arctic Ocean by way of the north coast of Norway. The waters become denser as heat is radiated. On account of this circumstance the stream appears as a middle or lower current farther on in its course. Its effect upon the temperature of the Bermudas is marked, giving these islands a semi-tropical climate. On the other hand, its union with currents moving toward the northeast along the shores of Europe has a modifying effect upon the climate of Great Britain and the Scandinavian peninsula. In commerce it is quite important from the fact that vessels sailing

in the current are enabled to gain marked advantage in navigating portions of the ocean, gaining thereby considerable time.

GULF WEED, a genus of seaweeds floating in the Atlantic Ocean within an area of about 250,000 square miles, and so called because they are found chiefly in the Gulf Stream. The best known of the large areas covered by seaweeds is the so-called Sargasso Sea, situated north of the Tropic of Cancer, in the north Atlantic, and west of the Azores. They propagate themselves by breakage.

GULL, a widely distributed genus of web-footed sea-birds, distinguished by large wings, small hind toes, slender legs, and a



1. ADULT GULL. 2. YOUNG GULL.

straight bill. Fully sixteen species of gulls have been studied, of which the color is variegated, though the prevailing hues are blackish-slate, pearl-gray, and whitish. Some varieties have black-and-white markings on the head that vary at different seasons of the year. The young are brownish and have a dark bill, but at maturity both sexes are very similar in color. They frequent the shores of lakes and the sea, while some species are seen far out from the land and appear to be tireless in their flight. They feed on fish, insects, and various forms of putrid food with much voracity. Their nests are along the shore or in rushes, where they breed once a year and rear from two to four young. The most common varieties include the black-headed gull, glaucous gull, common American gull, common herring gull, and the sea-mew. Sea-mews have a cry quite similar to that of a cat, hence the name. The flesh of sea-gulls is coarse, though their eggs are prized for table use, and the plumes serve as trimming for ladies' hats.

GUM, a vegetable secretion that exudes from intercellular spaces of certain trees, among them the peach, plum, and cherry. Gums are viscid. The purest varieties are transparent or translucent, pale yellow in color, but sometimes several shades darker. Among the more valuable gum products are those known as gum-arabic, gum-senegal, East India gum, cherry-tree gum, and Barbary gum. The gum taken from the spruce tree is prepared for chewing-gum and sold in the market, and there are various other classes of this product prepared and sold in the form of confections. Gum-resins are the inspissate juices of certain plants containing both gum and resins. They are obtained from certain plants either by spontaneous exudations or from incisions. They include asafœtida, myrrh, aloes, and many others

GUM ARABIC (ăr'ă-bĭk), a gum obtained from the acacia arabica, a plant abundant in Arabia and India. For the purpose of securing a large yield it is necessary to make incisions in the bark, from which the gum exudes spontaneously. The product is transparent, often colored yellow or brown by impurities. It is inodorous, brittle, and has a bland taste. Gum arabic is useful in calico printing, for cement, for ink, in pharmacy, and in finishing fabrics.

GUN, a term applied to any weapon having a barrel designed to receive and discharge a missile, in the projection of which powder, gun-cotton, or air may be employed. The various implements ranging from the hand gun or pistol to the largest cannon are described by the name, but in common use it is customary to limit the term to the sporting gun. When gunpowder first came into use different terms were applied, such as bombards in Italy and crackeys in England. The early cannons were about the size of large muskets, and by means of them it was as common to throw stone and iron as leaden balls. They were not only comparatively small, but hard to manipulate, and firing was slow and ineffective as compared with the newer implements of modern times. The most rapid firing in 1638 by the musketeers was from seven to ten shots per hour. At that time it was quite common to use a match-firing gun, but soon after the flint

BREECH-LOADING GUN.

lock came into general use, this being an invention of highwaymen, who found that firearms in which matches entered were liable to lead to their discovery.

The flint-lock guns were in common use in Europe till 1840, when more effective and rapid firing weapons took their place. As early as 1540 it was common to use pistols in warfare and for personal protection, the weapons being confined to a place of concealment and used as a surprise to the enemy. The pistols used in the 18th century contained a cylinder with four barrels, which revolved much like the cylinders of

newer implements of a like character. At an early date the art of aiming and firing by holding the implement in one hand developed into a very skillful practice, equaled only by pioneers and herdsmen, who still delight in practicing at pistol firing. The modern magazine gun has a shorter barrel than the old musket and also a smaller bore, yet the carrying power is greater and its accuracy of a much higher character. This is due largely to the rifling or grooving of the barrel, an art developed only in recent years. The larger implements of war are classed as cannon, which include mortars, howitzers, and siege guns. In the largest cannon the barrels are about sixty feet long. These implements weigh 125 tons, carry projectiles or shells weighing 1,800 pounds, and consume 900 pounds of powder in a single charge. The guns used in the United States army and navy weigh about sixty tons, are forty feet in length, five feet in diameter at the larger end, and have a rifle bore. Besides these, there are also rapid-firing and machine guns, by means of which it is possible to fire as high as 800 shots per minute.

All the different varieties of guns are made of steel, and are thoroughly tested before being used in the public service. The Gatling gun, invented in America and adopted in 1866 for the United States service, served to fire 1,200 shots per minute in special tests. The Krag-Jörgensen gun is used in the infantry of this country, having been adopted in 1896. The largest establishment for manufacturing guns is the celebrated Krupp works at Essen, Germany. The guns manufactured there have gone widely into use and are among the best in the world. The most remarkable single gun manufactured at that establishment was completed in 1886, by means of which it was possible to throw a ball weighing 2,300 pounds a distance of nine miles, and with it penetrate iron plates four feet thick. All the modern guns are breech-loading, the projectile being first inserted, next the propelling force, and the breech plugged by means of a substantial screw plate.

GUNBOAT, a vessel of small size, usually supplied with a single gun. Vessels of this class are employed in war for attacking armored vessels, or for defenses on the coast and in rivers. Those of modern structure are armed largely with one heavy gun, which is mounted on the deck, and set on a pivot in such a manner that it may be turned in any direction. In other gunboats a single gun is so constructed that it may be raised or lowered by means of an engine, and in maneuvering it is necessary to turn the vessel. Iron-plated steam gunboats are a powerful aid in a fleet, and are employed extensively as auxiliaries.

GUN CARRIAGE, the apparatus upon which a cannon is mounted for service. There are various forms of construction, and may or may not be adapted for transporting the gun. Those used for siege and field purposes have a carriage designed for traveling, which consists of a forepart with two wheels, called a limber, and with the carriage proper forms a four-wheeled vehicle. The limber serves for the attachment of horses, but for action it is unlimbered, when it rests on a strong support called the trail and its own wheels. Land gun carriages include casemate, barbette, siege, and field carriages. The first two are intended to be kept in position at a particular fortification, while the last are adapted for transportation as well as for stationary service. The iron carriages of modern construction contain elaborate mechanical parts, combining convenience in transportation and firing, and are sufficiently substantial to endure elaborate use.

GUN-COTTON, or Pyroxyline (pī-rŏks'ĭ-lĭn), a powerful explosive substance prepared by the action of nitric acid on cotton-wool. It was discovered by Christian F. Schonbein (1799-1868), a German chemist, in 1845. His experiments in mixing nitric and sulphuric acids with cotton-wool demonstrated that the product possesses a highly combustible property, and that its burning results in an explosion. It is prepared at present by drying cotton-wool at 100°, then submerging it in a mixture consisting of one volume of nitric acid and three volumes of sulphuric acid, and leaving it immersed for twenty-four hours. Next it is washed with water or a preparation of alcohol to remove the lower nitrates. It explodes at about 165°, if finally divided, though when compressed burns like tinder, but may be exploded by a mercuric fulminate. If washed in soda, it retains its explosive properties to the best advantage. The principal advantage of gun-cotton over gunpowder is that it can be conveyed safely in a moist state without injury and is almost smokeless. In mining and for torpedoes it serves a highly useful purpose. It also has been introduced as an effective agent in warfare. In photography an imperfect chemical form of gunpowder, known as collodion, is used. This is soluble in a compound of alcohol and ether.

GUNNERY, the branch of science which treats of the construction and mode of firing guns, but the term musketry is also applied, though more especially to like purposes in small arms. Much has been written on the subject of gunnery, the first standard work being that of Nicolo Tartaglia (1500-59), an Italian mathematician, who published a treatise called "New Science" in 1537. Other publications of note are the "Dialogues on Motion" published by Galileo in 1638, and the "New Principles of Gunnery" by Benjamin Robbins in 1742. The latter, besides treating of the resistance of air, bore of guns, methods of taking aim, and the force of gunpowder, produced an invention for measuring the velocity of cannon-balls, a

mechanism not superseded until 1862. By a study of the theory of gunnery it has become possible to solve many problems relative to the best systems of constructing fire-arms for the purpose of securing the most serviceable motion of projectiles through the air, and for manufacturing implements of the proper length, rifle bore, thickness, weight, and strength. It has also aided in solving the problems involved in actual firing, such as calculating the necessary velocity, range, angle of elevation, rotation of projectiles while passing through the air, and other questions involved both in individual firing and in handling a large number of guns in time of war. Guns manufactured according to the better methods take into account the necessary velocity and the effect upon it by the recoil, as well as the construction most effective in the different kinds of fire, as direct fire, vertical fire, and enfilade fire. By direct fire is meant the discharge of projectiles horizontally against the front of a column, while vertical fire implies aiming at a high angle of elevation, and enfilade fire that in which projectiles sweep against earthworks or lines of men.

GUNPOWDER, an effective explosive mixture of charcoal, saltpeter, and sulphur, but the composition varies according to the uses for which it is employed. The ingredients are pulverized separately into fine particles, and mixed carefully in the proportion of about seventy-five per cent. of saltpeter, the remaining twenty-five per cent. being divided equally between sulphur and charcoal. In manufacturing in the United States the mixed materials are subjected to great pressure for the purpose of forming a solid cake; this is next ground into fragments, and the grains separated by sieves. The necessary apparatus includes a series of sieves or screens, by means of which the different sizes are separated from each other. The dust particles remaining are again pressed into cakes, the proper sizes being utilized in forming the different grades of gunpowder, and the coarser residue, if any, is broken into finer particles. The pressure is applied while the material is in a moist state, and determines the character of the explosive; high pressure giving violent action, while the milder pressure causes the product to be less violent as an explosive. When the grains are first separated, they contain sharply-marked points, but these are worn off by placing the granulated powder in barrels and revolving them for a period of four to twenty hours. This process is accomplished while the powder is still moist, and is necessary to give the grains a perfectly smooth surface. After this process the granulated powder is glazed with graphite and subjected to a process of drying in a large room under a temperature of 135°.

The most common grades of powder are known as mammoth, cannon, mortar, and musket powder, the latter being the finest-grained and is used largely in the smaller fire-arms. The coarser-grained powder is more serviceable in the larger guns, since the strain produced by it tends rather to move the projectile forward than to effect an influence by which its force is lost before the projectile is started, as is the case with small-grained powder. In recent years much progress has been made in the use and effectiveness of smokeless powder. This class is used almost exclusively in small and rapid-fire guns by the principal nations, and many of them also employ it for field and heavy cannon. The reason that smokeless powder possesses superior value is that the dense volumes of smoke arising from rapid firing tend to obstruct the view and impede the successful operation in time of battle.

The powders usually classed as smokeless are more properly designated as semi-smokeless, since they produce a small amount of smoke. Powders containing ammonium nitrate as a principal ingredient yield products that are largely gaseous and almost invisible. There are three classes of true smokeless powder, of which the ingredients consist mainly of nitro-cellulose, a mixture of nitro-cellulose and nitro-glycerine, and those containing nitro-derivatives of the aromatic hydrocarbons. Among the objects sought in manufacturing an effective and serviceable powder may be named the property of being smokeless. To this must be added high and uniform velocities with safe and regular pressure; the property of not excessively fouling in the gun; the virtue of not being unusually liable to ignite from the effect of friction or a shock, and that it be not excessively difficult to ignite when placed in the gun ready for use. Besides these essentials, high grade powders must not be impaired by temperature, age, and moisture, and be free from obnoxious and irrespirable gases when used in firing. Manufacturers also take into account the chemical and physical effects of powder upon the gun, and seek to produce grades that will not rapidly erode or corrode the barrel.

The history of gunpowder properly dates from the 7th century, when it was employed by the Byzantine emperors to defend Constantinople against the Saracens. However, it is of great antiquity among the Chinese, who employed it for blasting rocks and in manufacturing fireworks long before the Christian era. It is quite certain that the discovery was made by the Chinese while accidentally mixing saltpeter with sulphur and charcoal, and that the products used by them were greatly inferior to the varieties in use at present, or even during the Middle Ages in Europe. A German monk named Berthold Schwartz made valuable discoveries in 1336, which greatly facilitated the manufacture and also increased its propulsive power. Guns were used by the British as early as 1327, during the invasion of Scotland by Edward III. In 1342 powder was

employed at the siege of Algesiras by the Moors, and shortly after attracted the attention of various European nations. The manufactories of gunpowder established in Germany and Italy were among the first in Europe, and the first in England were founded about 1590. The American colonists brought gunpowder to America, but even before their time it was used extensively by navigators and explorers who cruised on the American shores. At present the United States ranks as one of the principal powder manufacturing countries in the world, its product being both large in quantity and efficient as an explosive projectile agency.

GUNPOWDER PLOT, a celebrated conspiracy formed in England in 1604 by Robert Catesby and several Roman Catholics of rank for the purpose of blowing up parliament and the king as a matter of revenge on account of penal laws directed against their faith. The time fixed for the execution of the plot was Nov. 5, 1605, and it was designed to destroy the commons, lords, and king by one blow. The plan was to excavate a channel so as to form an underground passage, but later a cellar under the chamber of parliament was rented, and in this the powder was stored. An anonymous letter was sent to Lord Mounteagle, a Catholic peer, advising him not to be present at the meeting of parliament, which that gentleman delivered to Cecil, then secretary of state, and from this the plot became known. An investigation led to a discovery of thirty-six barrels of powder and several large quantities of other explosives, together with billets and faggots. Guy Fawkes was arrested while starting to ignite the explosives, while several others were apprehended, tried at Westminster, and executed on Jan. 30 and 31, 1606. A later investigation demonstrated that the Catholics, with few exceptions, were not implicated and knew nothing of the plot.

GUNTER, Edmund, mathematician, born in Hertfordshire, England, in 1581; died Dec. 10, 1626. After graduating from Oxford, he became a minister in 1614, and was appointed professor of astronomy in Gresham College, London, in 1619. This post he held until his death. He is noted for several inventions and numerous terms treated by him, such as quadrant, bow, cotangent, and cross-staff, as applied to his inventions. The Gunter's chain in common use for measuring land was also invented by him. It is sixty-six feet long, contains one hundred links of 7.92 inches each, an acre being equal to ten square chains. Gunter's scale is a large plane scale having various lines and numbers engraved on it, and serves a useful purpose in making calculations in navigation and surveying by mechanically moving a slide.

GUSTAVUS I. (gŭs-tā'vus), known as Gustavus Vasa, king of Sweden, born May 12, 1496; died Sept. 29, 1560. He descended from a nobleman named Eric Johansson, and became distinguished in early life on account of his activity in the wars against Denmark. While serving under Svante Sture he was taken captive, and with several Swedish nobles was conveyed to Jutland as a prisoner, but a year later escaped and returned to his native land. After engaging in industrial pursuits, largely on account of the impoverished condition of Sweden, he succeeded in stimulating his countrymen to activity, and in 1520 was successful in expelling the Danes from Stockholm. In 1523 he completed the liberation of Sweden and was elected its king. Soon after he strengthened the army, built canals and highways, constructed fortresses, and fostered commercial enterprises. In 1529 the Roman Catholic religion was abolished and Protestantism established in its stead. Later he carried Protestantism to Finland and Lapland, founded schools and colleges, and gave to Sweden a long and prosperous reign.

GUSTAVUS II., known as Gustavus Adolphus, king of Sweden, grandson of Gustavus I., born in Stockholm, Dec. 9, 1594; died at Lutzen, near Leipsic, Nov. 16, 1632. He received a liberal education, was brought up strictly in the Lutheran faith, and became able to use efficiently eight different languages. His training also included practical work in commercial studies, music, and other useful arts. In 1611 he became king of Sweden, and at once entered upon the reorganization of the government, raised a sufficient army to repel incursions by the Danes, and in 1613 concluded a treaty by which important possessions on the Baltic were acquired by Sweden. In 1617 he concluded the peace of Stolbova, obtaining by it Krelia, Ingria, and a portion of Livonia from the Russians. The following year he traveled extensively in Germany, and married the daughter of the elector of Brandenburg two years later. About that time a war began with Poland. After engaging in hostilities nearly nine years, he concluded the peace of 1629, by which important cessions were obtained in East Prussia. The progress made by Wallenstein in his war against the Protestants caused him to become alarmed, and, his sympathies being aroused also by the oppressions of Ferdinand II., he collected an army of about 20,000 and embarked to join the Protestant forces against the Catholic league. In 1630 he landed at the mouth of the Oder, and soon came into possession of Pomerania. Soon after, in 1631, he defeated the imperial army at Leipsic, Wurzburg, and several minor points. In 1632 he forced a passage of the Lech, and soon after obtained possession of a large portion of Germany. These successes caused Wallenstein to muster an army of 40,000 with which to block the advance of Gustavus, who purposed to attack Vienna. The two forces met at Lutzen, near Leipsic, during a dense fog. Gustavus, while leading a cavalry charge, became separated from his

men, and was killed by a company of Croats. As a soldier, disciplinarian, and ruler he holds high rank in history, and by his successes became the central hero of the Thirty Years' War. His energetic military campaign in Germany preserved Protestantism to Europe and the world.

GUSTAVUS III., king of Sweden, born in Stockholm, Jan. 24, 1746; died March 29, 1792. He succeeded his father, Adolphus Frederick, in 1771. Soon after he inaugurated a reform policy by forcing the nobles to accept a new constitution, whereby their privileges became much restricted. In 1778 he succeeded in gaining a victory over the army of Russia and Denmark at Fredericks-hall, and the following year extended his prerogatives by arresting the opposition leaders. Shortly after the commencement of the Revolution in France, he sought to form a coalition with Denmark, Russia, and Spain for the purpose of counteracting republican principles, but was shot by Anckarstroem as a result of a conspiracy formed by the nobles before completing the alliance.

GUSTAVUS IV., king of Sweden, son and successor of Gustavus III., born Nov. 1, 1778; died in St. Gall in 1837. He succeeded to the throne on March 29, 1792, and pursued the policy of his father in opposing the principles involved in the French Revolution, which caused French troops to occupy Swedish Pomerania and resulted in serious loss of territory to Sweden in 1807. The following year he lost Finland on account of his offending Russia by opening Swedish ports to English vessels. In 1809 a revolution occurred in Sweden, which resulted in the forced abdication of Gustavus on March 29. He was succeeded by his uncle, the duke of Sudermania, as Charles XIII. Gustavus shortly after left Sweden and died in poverty.

GUTENBERG (goo'ten-bĕrg), **Johannes**, inventor of printing with movable blocks, born in Mentz, Germany, about 1400; died there Feb. 24, 1468. He became known by his mother's name, Gutenberg, his father's name being Johannes Gensfleish. Little is known of his life aside from his useful invention, which has largely revolutionized civilized arts. He taught stone-cutting, wood-carving, and mirror-polishing in Strasburg in 1434. From a decision rendered in the law courts of Strasburg it is learned that he formed a partnership with Andrew Dritzehn for the purpose of practicing printing with a press and a type-mold. He returned to Mentz in 1448, and the following year formed a partnership with Johannes Faust with the view of engaging in the printing business. Faust seems to have been a capitalist and by the terms of partnership furnished the necessary funds to enable Gutenberg to carry on the business. The partnership was terminated in 1455, Faust suing for money advanced and thereby securing possession of the printing supplies and business. Shortly after he concluded a partnership with Conrad Homery, built a new press, and transacted a limited amount of business. The productions of Gutenberg are difficult to identity, owing to a failure to place an imprint on any of them, but it is thought he published several books, both at Strasburg and Mentz. The most important of his productions is the Mazarin Bible, published while in partnership with Faust. His printing was done with wooden type and blocks, but shortly after his death metal type came into general use. The ancient Chinese, Babylonians, and Chaldæans practiced printing from large blocks, and several of their pictures and books are extant, but Gutenberg was the first European to introduce the printer's art and reduce it to practical utility. A fine bronze statue, the work of Thorwaldsen, was erected to his memory at Mentz in 1837.

JOHANNES GUTENBERG.

GUTHRIE (gŭth'rę), an important city in Logan county, capital of Oklahoma, on the Cimarron River. It is surrounded by a fertile agricultural and dairying country. The streets are regularly platted and lighted with electric lights. It has good railroad facilities, rapid transit, pavements, fine public buildings, and city waterworks. There are excellent schools, a public library, numerous periodicals, and a growing commercial trade. Among the manufactures are flour, furniture, vehicles, machinery, cigars, and cotton products. The population in 1890 was 2,788, but its steady and remarkable growth is evidenced by a population, in 1900, of 10,006.

GUTHRIE (gŭth'rĭ), **Thomas**, author and orator, born in Brechin, Scotland, July 12, 1803; died Feb. 24, 1873. He studied at the University of Edinburgh and in Paris, and in 1837 became minister of a parish in Edinburgh. In 1843 he went over to the Free Church, and for a long time served successfully as minister of St. John's. In 1862 he was moderator of the general assembly of the Free Church in Scotland. Guthrie possessed remarkable ability as a public speaker, was a devoted advocate of temperance and compulsory education, and displayed a spirit of generosity in founding institutions for the support and instruction of the poor. Among his best known publications are "A Plea for Drunkards;" "Sins and Sorrows of the City;" "A Plea for Ragged Schools;" "Gospel in Ezekiel," and "Parables and Studies of Character."

GUTTA-PERCHA (gŭt'tà-pĕr'chă), the inspissated juice of the gutta-percha tree, which somewhat resembles caoutchouc, but differs from it in being more soluble and stronger, but less elastic. The gutta-percha tree has a trunk of two or three feet in diameter, grows to a height of sixty or seventy feet, and abounds in southeastern Asiatic islands, principally in Borneo, Singapore, and Sumatra. The juice is extracted by tapping. It is brownish-red in color when pure, hard and tough below a temperature of 90°, and can be molded into various designs at a temperature of 145° Fahr. Its principal use is for coating submarine telegraph wires as a protection against salt water. In a modified form it is used for the soles of boots, ear trumpets, door handles, bottles, and hose tubes.

GUYOT (gē-o'), **Arnold**, celebrated geographer, born in Switzerland, Sept. 28, 1807; died in Princeton, New Jersey, Feb. 8, 1884. In 1835 he graduated from the University of Berlin, Germany; was associated as instructor with Agassiz at Neuchatel in 1839-48, and in the latter year accompanied him to America. In 1849 he delivered a course of lectures on "Earth and Man" at Lowell Institute, Boston, and in 1854 became professor of geology and physical geography, which position he filled until his death. In the meantime he also delivered several courses of lectures at the Smithsonian Institution. Among his many eminent works are "Treatise on Physical Geography;" "Meteorological and Physical Tables," and "Biblical Cosmogony in the Light of Modern Science."

GUZMAN-BLANCO (gooth-män'blän'-ko), **Antonio**, South American statesman, born in Caracas, Venezuela, Feb. 29, 1829; died in Paris, France, July 29, 1899. He secured a liberal education at the Caracas University, joined in the Revolution led by Juan Falcon, and in 1863 became vice-president of the republic. In 1870 he was elected president and held that office a period of twelve years, during which peace and prosperity were maintained. He was appointed ambassador to France in 1883, was again elected president in 1886, but was displaced by a political rival, Rojas Paul, two years later. In 1889 he was deposed by the Venezuelan congress and lived in retirement in Paris until his death. In his administration of the office of president many important canals, railroads, schools, and municipal improvements were made, while public credit and relations with foreign countries were promoted successfully.

GWALIOR (gwä'lĕ-ôr), a fortified city of India, capital of the state of Gwalior, about sixty miles south of Agra. Its fortifications are situated on an elevated rocky eminence and are accessible only by steps, the whole constituting the most formidable strategic point in India. The older portion of the city is situated at the base of the rocky heights. It contains a preponderance of stone buildings, and is noted for its ancient temples of interesting Hindu architecture. The old town has a population of about 25,000, and the new town, known also as Sashkar, is situated toward the southwest and is a prosperous city of 104,750 people. It has important railroad connections, beautiful streets, and contains numerous manufactories and other industries.

GYMNASIUM (jĭm-nā'zĭ-ŭm), a name applied by the Greeks to the public places and buildings where the Grecian youths exercised themselves by running, leaping, wrestling, boxing, and throwing the spear. The most noted were located at Athens. That city contained seven resorts classed as gymnasiums, which were frequented not only for gymnastic exercises, but also for instruction by rhetoricians, philosophers, and the eminent teachers who delivered their lectures as a means to cultivate the intellectual faculties of youth. The term gymnasium is used to designate a system of schools in Germany, which occupy a place immediately between the elementary schools and universities, serving as feeders of the latter. In these institutions the youth of Germany are trained especially for admission to the universities, and before completing the course are required to take a critical examination in at least one modern language, history, Greek, and Latin.

GYMNASTICS (jĭm-năs'tĭks), a word derived from gymnasium, and used to designate any system designed to discipline the physical and muscular powers of the body by exercising in feats of bodily skill. Games for the purpose of encouraging outdoor exercises by children are as old as human history, though the various games have shown a marked difference in the various ages. Among the most common popular at present are those of baseball, football, tennis, croquet, rowing, and others designed especially for children younger than those adapted to playing the recognized standard games. However, the term gymnastics is applied more strictly to indoor exercises, usually those that involve muscular activity under system, and are performed in special rooms or departments set aside for the different sexes in many of the schools, colleges, and universities. It has been found that these exercises are helpful in invigorating especially the students of sedentary habits, giving greater strength to muscles and frame, and also imparting such a degree of general vigor to the system that intellectual development becomes more marked and rational. Perhaps, the ordinary infantile and childhood pastimes are sufficient to engage the attention of most children until twelve years old, but from that time to the age of thirty-five it is highly beneficial to take rational and suitable exercise at regular intervals, though much care is necessary lest the system be overtaxed and the vital organs

fatigued. For this reason it has been found highly profitable to place the gymnasium under special supervision of competent directors, and guide the gymnastic training of each pupil in accordance with individual needs. This is true especially in beginners for the reason that some experience is necessary in order to estimate the proper amount of invigorating exercise wholesome to the system.

GYPSIES (jĭp'sȳz), a peculiar race of people found widely distributed in most parts of the world, and known among themselves as Romani. The name Romani was derived from Rom, the Egyptian word meaning man, and Romni, meaning woman. Formerly the French called them Bohemians for the reason that they regard them banished Hussites from Bohemia, while to the Germans they are known as Zigeuner, a term thought to have been derived from the Italian Zingari. The name Romani seems to imply their descent from early Egyptian, but the language, which is the same among the wandering companies in all countries, indicates descendance from the people of India, probably from the Hindus. Like the Jews, they have been able to preserve their identity and language in a remarkable degree. The color is yellowish-brown, hair and eyes jet black, limbs symmetrical, teeth extremely white, and size medium. They are rarely content to make permanent settlements, but prefer to wander in emigrant wagons or live in tents. The older women turn a few pennies by telling fortunes; the younger women engage extensively in selling wares and fruits, while the men vend notions, trade horses, perform sleight-of-hand tricks for exhibition purposes, or engage as general traders. Their musical skill is remarkable, and many of their melodies have become incorporated with the most noted operas and cantatas.

The vocabulary of the Gypsy language is limited to about 5,000 words, which are taught by vocal sounds, and no idea of a general education is possessed. They marry and divorce without much ceremony, have no particular religion, exhibit much delight at turning a good bargain, and are given to amusements and games. As a rule the children are reared in indolence and ignorance, while traits of superstition and boastfulness are common. Historical writers generally agree that they appeared as wandering people in Germany, Italy, Switzerland, and France about 1417, thence moved into Spain about 1445, Russia about 1500, and Sweden and England about 1514. The kings and princes of many countries have been friendly to them on account of their harmless disposition, though in some localities they were charged with being spies and kidnapping children for the purpose of securing ransom. Straggling parties emigrated to America shortly after permanent settlements were made, and at present the Gypsy population in the United States is considerable. The total number of Gypsies in the world is estimated at 650,000, though this does not include those that have become assimilated by other peoples, which, however, does not occur with much frequency.

GYPSUM (jĭp'sŭm), a mineral occurring in monoclinic strata as alabaster in a compact state and as selenite in crystallized form. It is also found extensively in the form of a soft, chalky stone, this being transformed into plaster of Paris by kiln-drying. The common characteristics of gypsum are its color, which includes white, gray, yellow, blue, reddish-brown, and black. It is often transparent, though usually opaque. The grade designated as soft and chalkish stone occurs largely in Michigan, Kansas, Texas, New York, Iowa, Ohio, and several other states. At Paris, France, it is found in extensive masses, hence its name, plaster of Paris, when manufactured. The rock masses containing gypsum may be found in any geological age, but occur most frequently in the alluvial formations of the more recent periods. Gypsum is still being formed by the action of water, which holds in solution different ingredients, such as calcareous rock particles carried by mineral waters in volcanic regions, from the combination of sulphuric acid, from iron pyrites, or as a deposit from water in which it is held in a soluble state. It occurs most abundantly in combination with water, and is the substance to which the hardness of water is due. Among the uses of gypsum are its employment for fertilizing, cornice moldings, interior decorations for buildings, models in statuary, and in preparing articles for ornamentation, though for most of these purposes it must be subjected to varied forms of treatment. The annual production of gypsum in the United States is placed at about 480,000 tons, which represents a value of $1,175,000.

WAMPUM.

H

H, the eighth letter and sixth consonant of the English alphabet, but usually classed as an aspirate rather than a consonant for the reason that its sound is a mere breathing or aspiration of vocalized breath. Its distinctive sound occurs when it is written as the first letter of a word and when following a vowel, as in help, heavy, hope, and where and whither. In combination with other letters it is used to represent sounds in digraphs, such as child, this, than, shift, and in others in which the digraph is silent, as in plough and bough. In some cases it is combined with consonants to represent the sound of f, as in tough and enough. In words taken from the Greek ch generally has the sound of k, as chyle, chemistry, and others.

HAARLEM (här'lem), an important city of Holland, in the province of North Holland, about ten miles west of Amsterdam. It is connected by important railroad lines, traversed by a system of canals, and its buildings are largely of the typical style found in the Netherlands. The cathedral of St. Bavon, one of its finest buildings, is an ancient and famous structure. It was erected in the 15th century, is 425 feet long, and crowned by a tower 253 feet high. There are numerous scientific schools, associations of general learning, and fine parks and statuary. The manufactures include machinery, beverages, woolen goods, clothing, silk, laces, and embroidery. It also ranks as a center of trade in flowers and merchandise, and is noted as the seat of the most extensive type foundry and printing establishment in Holland. Among the celebrated men born in Haarlem is Laurens Coster, an accredited inventor of movable types for printing. Population, 54,372.

HABAKKUK (ha-băk'kuk), one of the twelve minor prophets, who flourished in the 7th century B. C., and is noted for his prophecies of God's retributive justice against the Chaldæans. He appears in the light of a prophet of Judah, flourishing from about 630 to 590 B. C. His prophecies hold high rank. They are favorites on account of sublime thought and beauty of construction.

HABEAS CORPUS (hā'bē-ăs kôr'pŭs), a legal writ of relief directed to the person detaining another, and demanding him to produce the body of the prisoner at a specified time and place. The term is of Latin origin, meaning you may have the body. A writ of habeas corpus may be issued in all cases where a person in custody claims to be illegally detained or wrongfully refused bail, or who desires to be removed to a different court than the one in which the case is pending. In the United States the writ of habeas corpus is assured to all persons by the constitution of the United States, and also by those of most of the states. It can be withheld only in cases of rebellion or invasion, or when the public safety may require its suspension.

HACKENSACK (hăk'ẹn-săk), county seat of Bergen county, New Jersey, on the Hackensack River. It is connected extensively by railroads and has electric street car facilities. Among the conveniences are city lighting, pavements, a public library, and several fine school and church buildings. There are manufactures of brick, silk, jewelry, and utensils. Many business men of New York City have their residence at Hackensack. Population, 1900, 9,443.

HADDOCK (hăd'dŭk), a fish belonging to the same family as the whiting, coal-fish, and the cod. In size it is smaller than the cod, but it resembles that fish. It has a pale-

HADDOCK.

brown back, under part silvery-white, three dorsal fins, and is flattened between the eyes. This species of fish is valued for food, weighs from two to eight pounds, and breeds in the northern seas in February and March. The haddock is a common fish on the Atlantic coast of North America and Europe. An allied species called the Norway haddock is smaller and is abundant off the coast of Newfoundland.

HADLEY, Arthur Twining, scholar, born in New Haven, Conn., April 23, 1856. He was a son of James Hadley, and, after attending the Hopkins Grammar School, studied at Yale, where he graduated in 1876. Later he pursued advanced courses at the University of Berlin, Germany, and in 1879-83 taught at Yale. In 1885-87 he served as commissioner of labor statistics, in which capacity he prepared several valuable reports relative to labor problems, and was associate editor of the "Railroad Gazette," New York, for two years. On March 25, 1889, he was elected president of Yale University, in which position he demonstrated marked ability as an organizer and guiding power. Among his best known writings are "Railroad Transportation" and "Relations Between Private Property and Public Welfare."

HADLEY (hăd'lĭ), **James**, philologist, born in Fairfield, New York, March 30, 1821; died Nov. 14, 1872. He graduated from Yale College in 1842, taught there until his death, and is celebrated on account of proficiency in Greek, Sanskrit, Hebrew, Arabic, Irish, and many other languages. Among his writings are "Elements of the Greek Language" and "Brief History of the English Language."

HADRIAN (hā'drĭ-ăn), **Publius Ælius Hadrianus**, emperor of Rome from 117 to 138 A. D., born in Rome, Jan. 24, 76 A. D.; died in Baiæ, July 10, 138. His father was a cousin of Emperor Trajan and died when Hadrian was but ten years old, and the latter was brought up under the charge of his kinsman. His connection with Trajan secured for him appointments to several important offices and distinction in the army, especially for the services rendered in the two Dacian campaigns, and, when Trajan returned to Italy, he became prefect of Syria. Having made himself popular with the army, he was declared emperor at the death of Trajan, and at once entered upon plans to pacify the internal differences in his vast dominion. Insurrections were in progress in Syria, Palestine, and Egypt, while the Parthians and others were seeking to attain independence. Adopting a policy of conciliation, he secured peace with the Parthians by ceding all possessions east of the Euphrates, concluded peace with the Roxolani and Sarmatæ by monetary concessions, and grew in popular favor at Rome by encouraging education, furthering internal improvements, and lightening taxation. About 120 he entered upon a tour of visitation to the different provinces of the empire for the purpose of studying their needs. After touring through Germany, Gaul, and Britain, he visited Spain, passed eastward into Asia Minor, and traveled through northern Africa. Upon reaching Greece, he settled for three years at Athens, but returned to Rome about 127. In 133 his army subdued a rebellion of the Jews after a destructive war of several years, this being the only armed conflict of considerable extent to disturb the peace of his long and successful reign. The "Edictum Perpetuum," a general code of laws, was promulgated by him in 131. The laws of Rome were based on the code of Hadrian for many years.

HÆCKEL (hĕk'ĕl), **Ernst Heinrich**, celebrated evolutionist, born in Potsdam, Germany, Feb. 16, 1834. He studied at Wurzburg, Berlin, and Vienna. His intense interest in zoological studies soon attracted the attention of scholars, and led to his appointment as teacher at Naples and Messina. In 1861 he became private tutor in the University at Jena, and was made professor of zoology there in 1865. Hæckel formed an intimate friendship with Darwin, traveled extensively in Eurasia and Africa, and visited many islands for the purpose of making original investigations of coral reefs and other forms of marine life. He is undoubtedly one of the most eminent evolutionists of the 20th century, and has attained to renown by his indefatigable research and careful study of that theory. Among his achievements are several new discoveries by which he fortified the doctrine that each organism repeats its phylogenetic history as it develops into maturity. He is the author of numerous publications, including "Origin and Development of Animal Tissues;" "Life in the Sea-Depths;" "Deep-Sea Medusæ;" "Darwin, Goethe, and Lamarck;" "Radiolariæ;" "Natural History of Creation," and "Riddle of the Universe."

HAFIZ (hä'fiz), **Muhammad Shems ed-Din**, Persian philosopher and grammarian, best known by his poetical name Hafiz, born in Shiraz in the early part of the 14th century; died about 1390. The attention of the reigning family of Persia was attracted by his studious habits and thorough scholarship, which led to his appointment as teacher of the royal family, and a government college was established in his honor. Soon after entering upon his work under royal direction, he produced many excellent poems relating to flowers, birds, sentimental subjects, and habits of life, and it is chiefly on account of his poetic productions that his name is well known in every family of Persia. The clear style and wonderful imagery of his writings have caused them to be translated into modern languages, and their popularity is still extensive in many countries of Eurasia and Africa. His collected work, called "Divan," contains seven elegies and 570 odes, called gazels.

HAGERSTOWN (hā'gẹrz-town), a city in Maryland, county seat of Washington county, in the Cumberland valley, about sixty miles northwest of Baltimore. It has waterworks, a free library, excellent public schools, an academy of music, and other institutions of learning. The city is noted for its social refinement, beautiful streets, and convenient railroad connections. There are a fine county courthouse, costing $76,500, and several beautiful churches. Among the manufactures are vehicles, farming implements, cigars, fertilizing, flour, pottery, brooms, and machinery. The surrounding country is agricultural and fruit growing. Population, 1900, 13,591.

HAGGAI (hăg'ă-ī), one of the minor prophets, whose name in Hebrew means "born on a festival." He was the first to prophesy after the captivity. His productions relate largely to the rebuilding of the temple, and were designed to enthuse his countrymen in devotion to their privileges and the worship of God. In his predictions are foreshadowed the building of a kingdom and the restoration of Jewish prosperity.

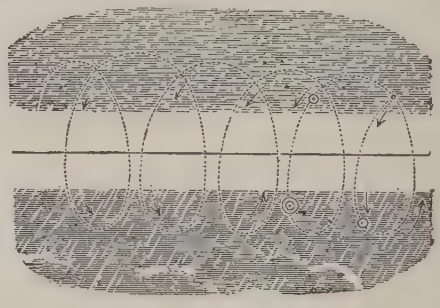
HAGGARD (hăg'ạrd), **Henry Rider**, eminent novelist, born in Norfolk, England, June 22, 1856. After attending the Ipswich

grammar school, he went to Natal, in 1875, as private secretary to Sir Henry Bulwer. In 1879 he returned to England, retired from official life, and engaged exclusively in the study and work of producing contributions to literature. Among his best known writings are "King Solomon's Mines;" "Dawn;" "She;" "Joan Haste;" "Cleopatra," and "Heart of the World."

HAGUE (hāg), **The**, an important city in the province of South Holland, and the capital of the Netherlands. Its location is pleasant, being three miles from the sea, thirty-three miles southwest of Amsterdam, and connected for commercial enterprises by canals, railroads, and numerous national and international steamboat lines. Among its most noted buildings are the palaces of the general government, several historic churches, a system of public schools, a number of colleges, and a university. The royal library contains 225,000 volumes, besides which are other public institutions, such as a public museum of antiquities and modern art, several parks and zoological gardens, a street railway system, and other modern facilities. The Hague is the most fashionable and modern city in Holland, and about three miles from it is the celebrated Scheveningen, a favorite bathing and pleasure resort. Its manufactures include firearms, jewelry, furniture, musical instruments, clothing, hats, machinery, and textile fabrics. Owing to its excellent facilities for entertaining visitors, it has been a favorite place for holding international congresses. Among the most recent held there was the peace conference suggested by the czar of Russia in 1899. This conference was called for the purpose of considering the gradual disarmament of civilized nations, whereby, if consummated, the burdens of vast standing armies would be largely lessened. In its deliberations the United States was represented by Andrew D. White, who was then United States ambassador to Germany. Population, 209,325.

HAHNEMANN (hä'neh-män), **Samuel Christian Friedrich**, founder of the homœopathic school of medicine, born in Meissen, Germany, April 10, 1755; died in Paris, July 2, 1843. He studied in his native town and afterward at the universities of Leipsic, Vienna, and Erlangen, graduating from the last named in 1779. Soon after he began the practice of medicine, translating also numerous works into German from the French, Latin, and English, and in 1789 returned to Leipsic for the purpose of continuing research in advanced chemistry. While there he translated Cullen's "Materia Medica" into the German, and became impressed with the unsatisfactory explanation given in that work for the effect of Peruvian bark in the treatment of ague. To learn of the effect of this medicine upon the human system he took several large doses and experienced ague symptoms, and from this he deduced the theory that a medicine having the properties to cure a disease possesses the ingredients necessary to produce symptoms of that disease in good health. In a like manner he also found that healing is effected rather by small than large and violent doses, from which he deduced another important theory; namely, the one having reference to a consideration of proper quantities of medicine in the healing art. Subsequently he devoted his attention to the publication of his theories and the principles upon which they are based. The opposition to the promulgation of his views became so general that in 1821 he was curtailed in the practice of his profession by a law which in effect prohibited the use of his methods. Shortly after he removed to Köthen, where he resided until 1835, when he settled in Paris. The most important of his writings include "Essays on Poisoning by Arsenic;" "Dictionary of Materia Medica;" "Effects of Coffee;" "Treatise on Chronic Affections," and "Treatment of the Asiatic Cholera."

HAIL, the small masses of frozen rain or congealed vapor falling from the clouds in showers or storms, constituting pellets or hailstones of variable sizes and shapes. Hail



THEORY OF HAIL BY ROTARY MOVEMENT.

results when considerable differences of temperature exist between lower and higher strata of air, and the presence of intense cold causes the moisture to condense suddenly. Usually there are several layers of dark, grayish clouds which move in different directions and have a varying temperature. Two kinds of hail are generally recognized, one consisting of small grains, which usually precedes the fall of snow, and the other being composed of hailstones. The latter class occurs most commonly in the spring and summer, but reaches its greatest severity and frequency in tropical climates. It is probable that the small hail pellets are formed by raindrops freezing as they fall through strata of colder air than those in which they were formed as raindrops. The larger class of hailstones are thought to be due to the coming together of clouds of vastly different temperatures.

On examining a large hailstone it is found to be constituted of concentric layers, similar to those of an onion, arranged around a ce-

tral nucleus formed generally of snow, but sometimes of ice. The stones are more or less spheroidal in shape and weigh from a few grains to several ounces, though hailstones weighing several pounds sometimes occur. The theory that accounts for the layers is that there are currents of wind which rotate like cyclones, but, instead of having vertical axes, they are horizontal. In such cases horizontal strata of clouds form some distance apart, the upper layer of snow and the lower of rain. The nuclei of the hailstones are formed in the upper layer in the form of snowflakes, are caught in the rotating currents of wind and carried alternately through the two layers of clouds, and in this way receive successive coatings of snow and ice until they finally fall to the ground.

Some naturalists attribute the influence of electrical attraction and repulsion as formative agencies of hail, since thunder and lightning invariably attend hailstorms. Other writers hold the view that there are many alternate layers of different clouds during the formation of large hailstones, and, in falling from the upper stratum through the different lower strata, they take on their peculiar characteristics by whirling through the successive cloud formations. Hailstones measuring about one-fourth of an inch in diameter are most frequent, but stones having a diameter of from two to five inches sometimes occur. In hot climates they are frequently of the larger size and effect much damage to growing crops. Noteworthy hailstorms are those that occurred in New Hampshire in 1851, at the Cape of Good Hope in 1860, and in Moravia in 1889. At the time of these historic hailstorms stones weighing from eighteen ounces to four pounds fell to the ground, destroying much vegetation and some human life. In many localities hailstorms occur in which the bark of trees is punctured, the heaviest plate-glass windows broken, and shingles of houses destroyed.

HAINAN (hī-nän), an island in the China Sea, belonging to the province of Quang-Tung, China, and separated from the mainland by the Gulf of Tonquin. It has a fertile soil, fine interior forests and productive fisheries. Its area is 16,150 square miles. Kiang-chow, an important seaport on the northern coast, is the capital. The population of the island is 1,510,000.

HAIR, one of the thread-like structures that grow from the skin or outer covering of mammals, serving as a protection similarly to the feathers and down of birds and scales of fishes and reptiles. All species of mammals in an adult state have hairs, which vary greatly in structure, as is noticed by comparing the finer kind of wool with the bristles of the hog and the quills of the porcupine. The hairs of the human head furnish a protection in heat and cold, and serve as a shield against blows. All parts of the body, except the palms of the hands and the soles of the feet, contain more or less hair growths, and the parts usually described as destitute of hairs are covered with a small colorless growth. In some males the breast, arms, shoulders, and other portions have hairs much like those common to the head. Each hair is hard and compact on the outside, and contains layers of colorless scales overlying one another like the shingles of a roof. The interior is porous, and is thought to contain the liquids by which it is nourished. It is a modified form of the epidermis, growing from a tiny bulb called the papilla, which is an elevation of the cutis at the bottom of a little hollow in the skin. The hair is produced from the surface of the bulb, like the cuticle, by the constant formation of new cells at the bottom, the old cells being pushed forward to constitute a portion of the hair shaft. Minute pigment granules, which are contained in the cells of the hair, determine its color.

Race characteristics greatly influence the color of the hairs, but it is also modified by age, sex, climatic conditions, and various other circumstances. In infancy the color is light, and with age it becomes darker and less fine. A growth of hairs commences in the arm-pits and on the breast at the age of puberty in both sexes, and in males a beard begins to appear. If the hair bulb is destroyed, the hair never grows again, but, if uninjured when a hair is pulled out, a new one is produced. Baldness is due usually to an affection of the papillæ, which results generally from an impairment of the blood circulation in the scalp, and grayness is attributed to the same cause, or to a deficiency in the amount of pigment granules in the hair cells. The hairs themselves are destitute of feeling, but nerves exist in the hollow in which each hair is rooted, thus accounting for the pain experienced when a hair is pulled. Small glands are connected with the hairs, and serve as lubricators to them and the skin by secreting an oily substance. The tendency of hairs to stand erect under the influence of cold or electricity is due to muscles interlacing among the fibers of the skin. In some animals these muscles are so well developed that the hairs may be moved to drive away flies, as is the case in horses, cattle, and sheep. Next to the bones and teeth, the hairs are the most indestructible portions of the body, and the color is preserved for many years after death. The hair structure in plants is an outgrowth of the epidermis, and may be either a single cell, a cell row, a cell surface, or a cell mass. These hairs usually consist of minute transparent tissue more or less elongated, arranged in a single row, and are of various types, such as scabrous, stellate, and uncinated hairs.

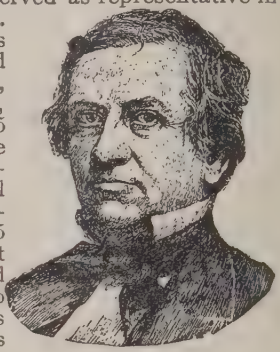
Hairs constitute an important material of manufacture; the product taken from cattle, goats, sheep, hogs, camels, and alpacas is the

most valuable. The purposes to which hairs are best adapted include the manufacture of upholstered furniture, hair cloth, brushes, fishing lines, and for use in plastering, spinning, and weaving various kinds of textile fabrics. Human hairs are used extensively in the manufacture of beards, wigs, watch chains, and other articles of dress and ornament. In Italy, Germany, France, and other European countries peasant girls sell their hair to dealers for the purpose of manufacture, these products being best when taken from living subjects. Other purposes to which hairs are put include the manufacture of brushes and hair pencils for painters, dusting brushes, and numerous fancy articles.

HALCYON (hăl'sĭ-ŏn), the poetical name applied to the kingfisher from early historic times. According to Greek mythology, Halcyone and her husband, King Ceyx, were transformed into kingfishers; hence the name halcyon. The idea of the ancients was that these birds lay their eggs in nests floating on the surface of the sea in calm weather, before and after the shortest day of the year, when the gods were supposed to keep the water smooth and tranquil for their benefit. Hence, the term halcyon days signifies a period of rest and untroubled felicity. This Grecian legend was mentioned by Shakespeare, Socrates, Aristotle, and other writers.

HALE, Edward Everett, clergyman and author, born in Boston, Mass., April 3, 1822. In 1839 he graduated from Harvard, was ordained a minister of the Congregational Church in 1842, and in 1846 became pastor at Worcester, where he remained till 1856, when he was selected as pastor of the South Congregational Church in Boston. A doctorate in theology was granted him by Harvard in 1879. As a minister, lecturer, and writer he was indefatigable, and exercised a wide influence for the elevation of mankind. His first editorial work was on the "Daily Advertiser," published in Boston. Later he revived the "New England Magazine," and in 1869 founded the "Old and New," which was later merged into "Scribner's Monthly." In 1870 he published "Ten Times One is Ten," a book which led to the organization of a system of clubs known as Lend a Hand, Lookup Legion, and Harry Wadsworth clubs. The motto of these clubs was, "Look up and not down; look forward and not back; look out and not in; and lend a hand." Among his best known publications are "In His Name;" "My Double and How He Undid Me;" "A Man Without a Country;" "Through Mexico;" "Story of Massachusetts;" "Family Flight Over Egypt and Syria;" "Life of George Washington," and "History of the United States." He also edited an American edition of Lingard's "History of England."

HALE, John Parker, statesman, born in Rochester, New Hampshire, March 31, 1806; died Nov. 19, 1873. He was admitted to the bar in 1830, elected state representative in 1832, and served as representative in congress in 1843-45. In 1846 he was chosen United States senator, serving till 1853, and again from 1855 to 1865. He was the candidate for president of the free-soil party in 1852, receiving 157,685 votes. President Lincoln appointed him minister to Spain in 1865. His public service is noted for the numerous pathetic and humorous speeches delivered in the senate, and his untiring opposition to slavery.



J. P. HALE.

HALE, Nathan, soldier and hero, born in Coventry, Conn., June 6, 1755; died in New York, Sept. 22, 1776. He graduated from Yale in 1773, engaged in school teaching, and enlisted as a volunteer in the Revolutionary War, attaining the rank of captain. Shortly after he visited the British camps in New York and Long Island disguised as a schoolmaster to obtain information for Washington, but, when about to return, the British arrested him as a spy, tried, and executed him. His last words were: "I only regret that I have but one life to lose for my country."

HALEVY (ä-lĕ-ve'), **Ludovic,** dramatist, born in Paris, France, Jan. 1, 1834. His father, Leon Halevy (1802-83), attained success as a poet and dramatist. He was of Jewish extraction. After Ludovic completed studies in Paris, he was attached to the ministry of state, and later became secretary of the colonial ministry. His writings first became known in 1861 and take high rank among European productions. In 1886 he was admitted to the French Academy. His most successful work is an idyllic story entitled "L'Abbe Constantin," which has gone through 200 editions and has been widely translated.

HALIBUT (hŏl'ĭ-bŭt), a genus of fish allied to the turbot, belonging to the family plaidæ.

HALIBUT.

They are among the largest of the flat fishes, specimens often weighing 600 pounds or more. Though esteemed for their food

qualities, they are inferior to the turbot. The genus is characterized by both eyes being on the same side of the head, lips large and fleshy, upper surface dark-brown with soft scales, and lower surface white. The oil is valued and is extracted largely from the bone. Halibut fisheries are especially productive off the northeastern coast of North America, Iceland, the Scandinavian peninsula, and western Europe, though various species are distributed widely in the Pacific.

HALIFAX (hăl'ę-făks), an important town in the county of York, England, situated on the Hebble River, about thirty-eight miles southwest of York. It contains numerous substantial buildings, has municipal facilities of importance, and is connected by important railroad lines. Among its manufactures are woolen goods, carpets, chemicals, ironware, and machinery. The output of carpets and worsted goods has given the town an extended reputation; these industries employ about 5,000 persons. Population, 95,235.

HALIFAX, a seaport city and capital of Nova Scotia, situated on the Atlantic coast, and connected with interior points by numerous important railroads. It is the principal harbor and naval station of the British possessions in America, is strongly fortified, and has an extensive export and import trade. The educational institutions include a public school system, several academies, and the Dalhousie University. There are also several scientific associations and institutions for the blind, deaf, and dumb. Its manufactures embrace tobacco, machinery, paper, leather, soap, and canned fish. Population, 40,832.

HALL, Charles Francis, Arctic explorer, born in Rochester, New Hampshire, in 1821; died Nov. 8, 1871. After learning the trade of a blacksmith, he became a journalist in Cincinnati. In 1859 he volunteered to accompany an Arctic expedition in search of Franklin, and accordingly organized the exploring party the following year. After cruising through the northern ice-fields, the vessel became blocked, and Hall remained with the Eskimos for two years, adopting their habits and language. A second expedition was organized by him in 1864, with which he remained among the Eskimos for five years. The United States government fitted out the steamer Polaris at his suggestion in 1871 for the purpose of making further search for Franklin, and, if possible, to reach the north pole. With this vessel he left New York on June 29, 1871. In August he reached Lat. 82° 16′ north, and returned to Lat. 81° 38′ for the purpose of wintering, where his death occurred. After many trying adventures and privations, the remaining crew abandoned the Polaris, reaching Littleton's Island in 1872, and in June, 1873, the party was rescued by a whaler. The experiences of the first expedition were narrated by Hall in his "Arctic Researches" and "Life Among the Eskimos," while the scientific results of the unfortunate expedition in which his life was lost were published by the United States. Dr. Emil Bessels, a member of the scientific staff, also published them in German.

HALL, John, clergyman, born in Market Hill, Ireland, July 21, 1829; died in Bangor, Ireland, Sept. 17, 1898. He descended from Scotch parentage, was educated at Belfast College, and in 1849 was licensed to preach by the Presbyterian Church at Belfast. After serving as missionary in Ireland, he preached successively at Armagh and Dublin, and became commissioner of education for Ireland. In 1867 he visited America and was called to the pastorate of the Fifth Avenue Presbyterian church in New York, a position he held until his death. Doctor Hall ranks as one of the most effective ministers of the Presbyterian Church. He was a devoted adherent to the Calvinistic faith, and opposed the liberal movement led by Doctor Briggs. His success was due to his simplicity of manner, sincerity, and spiritual devotion to religion. Among his publications are "Familiar Talks to Boys;" "Prayers for Four Weeks;" "Christian Home and How to Maintain It;" "God's Word Through Preaching," and "Light unto My Path."

HALL, Robert, minister and writer, born in Armsby, England, May 2, 1764; died Feb. 21, 1831. After completing a course of study at the Bristol Baptist Academy, he secured a liberal education at King's College, Aberdeen, where he graduated in 1785. His pleasing and fluent ability as speaker attracted large audiences, and gave him a high rank among the pulpit orators of England. In 1790 he was called to Cambridge, where he remained until 1806. Subsequently he settled in Leicester, and in 1825 took up his residence at Bristol, where he died. Among his publications are "Modern Infidelity;" "Apology for the Freedom of the Press," and "Terms of Communion."

HALLAM (hăl'ąm), **Henry**, historian, born in Windsor, England, July 9, 1777; died in Pickhurst, Jan 21, 1859. He was educated at Eton and Oxford and studied law at Lincoln's Inn, but soon after became interested in literature. In 1818 he published "View of Europe in the Middle Ages," by which he attained a high station among the historians of England. His works are characterized by patient research, accuracy, impartiality, and profound learning. His writings include "Constitutional History of England;" "Introduction to the Literature of Europe," and numerous essays published in magazines. Arthur Henry, his youngest son, was a young man of remarkable intellect, but died at the early age of twenty-two years. He was made the subject of the poem, "In Memoriam," by Tennyson.

HALLE (häl'le), a celebrated city of Germany, in Prussian Saxony, on the Saale

River, about twenty miles northwest of Leipsic. It is an important railroad center, has beautiful, broad streets, modern municipal facilities, and is connected with suburban districts by an extensive electric railway system. As an educational center it has long taken high rank. The celebrated university located there was founded by Frederick I. of Prussia in 1694, and in 1817 the University of Wittenberg was incorporated with it. Its courses of study are extensive. The corps of instructors includes 122 professors, and the attendance 1,775 students. Its library, museum, botanical specimens, and department of antiquaries are alike extensive and valuable. The city also has fine public school and church buildings, hospitals, scientific societies, and several equestrian monuments. Among the manufactures of the city are chemicals, machinery, dyes, oil, and malt. Within the vicinity are extensive mineral springs that yield great quantities of salt. Population, 162,635.

HALLECK (hăl'ĕk), **Fitz-Greene**, writer and poet, born in Guilford, Conn., July 8, 1790; died there Nov. 19, 1867. He descended from John Eliot, the apostle of the Indians, by his mother, became a clerk in a store at Guilford, and later in a banking house in New York City. In 1819 he formed an acquaintance with Joseph Rodman Drake and assisted in contributing to the New York "Evening Post," writing over the signature of Croaker & Co. John Jacob Astor appointed him private secretary in 1822, and left him an annuity which enabled him to retire in 1849 to his native town. The writings of Halleck show much care and finish, possess a fine degree of harmony, and are noted for their elevated and genial sentiment. His visit to Europe in 1822-23 enabled him to enrich his productions by coming in contact with many historical places. Among his best known writings are "To the Memory of Burns and Alnwick Castle;" "Marco Bozzaris;" "Young America," and "Fanny."

HALLECK, Henry Wagner, general, born in Westernville, New York, Jan. 16, 1815; died Jan. 9, 1872. In 1839 he graduated from West Point, enlisted for service in the Mexican War, and on account of gallantry was brevetted captain in 1847. In 1853 he became captain of engineers, but in 1854 left the army and settled in San Francisco as a lawyer and director of a mining company. At the beginning of the Civil War he was commissioned major-general in the army, and in 1861 placed in command of the department of the Missouri. The following year he directed the military operations in the west, and, when the battle of Shiloh had been fought, secured command of the entire force sent against Corinth. In July of the same year he became commander-in-chief, which position he held until superseded by General Grant in March, 1864. After the war closed he commanded the Pacific division until 1869 and subsequently the division of the south until 1872. He published "Elements of Military Art and Science" and several works on international law.

HALLELUJAH (hăl-lĕ-lū'yȧ), or **Halleluia**, an ascription of adoration to God, occurring at the commencement of many psalms, meaning praise ye Jehovah. It is a doxology in the Jewish synagogues, and was probably retained in Christian translations on account of its signification and poetic sound.

HALLOWE'EN (hăl-lō-ēn'), an abbreviation of "Alle halowene tyd," meaning all hallows tide, and applied to the evening of October 31 on account of that day being the eve or vigil of All Saints, which occurs on November 1. It is known in the United States principally on account of the practical jokes and youthful pranks that are played upon unsuspecting neighbors. In many countries it forms a time for evening fireside meetings, and was made the subject of Burns poem, "Hallowe'en."

HALO (hā'lō), a circle of light seen frequently around the sun and moon, and caused by the presence in the air of small particles of ice and snow, by which the rays of light are reflected, refracted, dispersed, and diffracted. Smaller and less distinct halos are caused by raindrops and vapors constituting clouds. There are at least three distinct forms of these phenomena: halos proper, caused by snow and ice particles; coronas, circles of light caused by condensed vapor; and paraselenæ, mock moons that appear on a lunar halo and resemble suns or moons. A fourth halo, observed by aëronauts on the upper surface of clouds, is called aureola.

HALPINE (hăl'pĭn), **Charles Graham**, known also as Miles O'Reilly, soldier and author, born at Old Castle, Ireland, Nov. 20, 1829; died Aug. 3, 1868. He graduated from Dublin Trinity College in 1846, came to New York in 1852, and was associated at different times with the "Herald," "Times," and "Tribune." He enlisted at the beginning of the Civil War, serving in many of the important battles. Subsequently he was made assistant adjutant-general on General Halleck's staff, receiving the brevet of brigadier-general of volunteers. He published "Baked Meats of the Funeral;" "Lyrics by the Letter H," and "Poetical Works of Charles G. Halpine."

HALSTEAD (hawl'stĕd), **Murat**, journalist, born in Paddy's Run, Ohio, Sept. 2, 1829. He was reared on a farm, graduated from Farmer's College in 1851, and became a district school teacher. In 1853 he reported for the "Cincinnati Commercial," of which paper he became proprietor in 1857. He became noted for his fearless, independent editorials. Later he was owner of the "Standard-Union" of Brooklyn, New York,

and had official connection with other newspapers. In 1896 he published "Story of Cuba," which created sympathy for the insurgents, and after the war with Spain wrote "History of the Cuban People."

HAM, the youngest of the three sons of Noah, and father of Cush, Canaan, Phut, and Mizraim. Canaan was the progenitor of the people of Palestine and Phœnicia, and the three others of the native inhabitants of Africa.

HAMATH, or **Hamah** (hā′mä), an ancient city of Syria, on both sides of the Orontes River, frequently mentioned in the Old Testament. It is situated in a fertile valley, about 110 miles north of Damascus. There are manufactures of flour, clothing, carpets, woolens, and jewelry. Though once a city of vast importance politically and commercially, it is now less fortunate. The population is 41,500, of whom about 10,000 are Greeks and fellahs.

HAMBURG (hăm′bûrg), the name of a free state and city of Germany. The city of Hamburg is situated on the north branch of the Elbe, about eighty miles from the North Sea, and is reached by the largest vessels. It dates from 809, when it was founded by Charlemagne. However, its commercial importance began in 1189, at which time it was made a free city. In 1241 it led in the formation of the Hanseatic League of towns, and soon after increased its territory. It was occupied by the French in 1806, annexed to France four years later, and, when French dominion ceased in 1814, it had lost much of its commercial importance. In 1815 it became one of the four free cities of the German Confederation, and since then has enjoyed phenomenal prosperity, though vast damage was done by a fire in 1842. Hamburg is the most important commercial city of northern Europe, having a fine harbor, wharves, and steamboat connections. It contains excellent public institutions, numerous centers of higher learning, and several libraries, observatories, and botanical gardens. Besides electric railways, it has waterworks, electric lighting, boulevards, sewerage, and many parks. The importance of its excellent harbor is increased by convenient railroad and canal facilities, while as a money exchange it is, next to London, the most important of Europe. The government is under a democratic constitution, with a local executive and council and representation in the reichstag of Germany. Among the manufactures are sugar, spirituous beverages, scientific instruments, cured meats, engines, machinery; cotton, woolen, and silk goods, cordage, and tobacco. Its shipbuilding yards are extensive and of vast importance. Educationally it is in a flourishing condition. In religion the people are largely Protestant. There is a Jewish population of about 17,000. Hamburg is properly a state, containing an area of 156 square miles. The entire population is 785,500, though this includes the suburban towns of Cuxhaven, Ritzebuttel, and several others. These and Hamburg proper constitute the most important passenger and emigrant center of northern Europe.

HAMERTON (hăm′er-tọn), **Philip Gilbert**, etcher and writer on art, born in Manchester, England, Sept. 11, 1834; died Nov. 6, 1894. He visited among the highlands of Scotland at an early age to study landscape painting from nature, and while there married a French lady. Later he resided in France, which accounts for his productions being largely concerned with the literature and thought of that country. After studying art in various European countries, he founded "The Portfolio" in 1869, a magazine of interest to artists. His principal works include "Thoughts About Art;" "Chapters on Animals;" "Etchings and Etchers;" "Modern Frenchmen;" "Man in Art;" "Human Intercourse;" "Contemporary French Painting;" "Drawing and Engraving," and "The Intellectual Life." His writings show a keen discrimination, wide range of knowledge, and a sympathetic interest in literature. A collection of his chief productions was published in Boston in fourteen volumes about the time of his death.

HAMILCAR (hạ-mĭl′kar), the name of several Carthaginian generals, the most celebrated of whom was Hamilcar, surnamed Barca, the father of Hannibal. In 247 B C. he became commander of the Carthaginian forces in Sicily, after the Punic War had raged about eighteen years and the Romans had conquered the larger portion of the island. His first success was in seizing an elevated hill called Ercte, which he made the base for his subsequent operations. Within the next three years he attained much military renown and ravaged the coast of Italy, but after the defeat of Hanno, the Carthaginian admiral, in 241, he evacuated Sicily. After the Carthaginian army was withdrawn, an insurrection broke out under the leadership of mercenaries and native Africans, which he suppressed in 238. Shortly after these successes he invaded Spain and founded an empire for Carthage. After operating there nine years, bringing the southeastern part of the Iberian peninsula under the rule of Carthage, he was slain in battle, in 229 B. C., while opposing the Vettones. His son, Hannibal, succeeded him in command of the army and carried forward the war against Rome with even greater determination.

HAMILTON (hăm′il-tọn), a city in Ohio, county seat of Butler county, on the Miami River, twenty-eight miles north of Cincinnati. It has an extensive street railway system, is connected by a number of important railroads, and by the Miami and Erie Canal. Its public school system is organized under a well articulated course of study. Many of the streets are finely paved, lighted by gas and electricity, and improved by sewerage,

waterworks, and avenues of trees. There are numerous churches, a free library, charitable institutions, and modern county buildings. The manufactured products include stoves, steam engines, candy, laundry machinery, hosiery, earthenware, vehicles, furniture, cordage, spirituous beverages, and textile fabrics. The city is noted for its commercial and educational enterprise. Population, 1900, 23,914.

HAMILTON, a city of Wentworth county, province of Ontario, Canada, situated at the west end of Lake Ontario, about seventy-five miles northwest of Buffalo, New York. It occupies a beautiful site at the base of a series of hills, has streets regularly platted, and is noted for its commercial importance. Its harbor is the scene of much navigation activity, while numerous railroads connect it with many business emporiums of Canada and the United States. The facilities include good educational institutions, electric street railways, public libraries, and several parks. As a manufacturing center it takes high rank among Canadian cities, the products including canned goods, flour, ironware, machinery, glassware, cotton and woolen goods, shoes, and musical instruments. Population, 52,634.

HAMILTON, Alexander, American statesman, born in Nevis, an island of the West Indies, Jan. 11, 1757; died July 12, 1804. He was of Scotch-French descent, and when twelve years old secured employment at St. Croix in the store of a merchant. Soon after his marked natural abilities attracted the attention of his friends, who raised a fund and sent him to school at Elizabeth, New Jersey, and when sixteen years of age he entered Columbia College, New York, as a student. While at college he wrote a number of articles in behalf of the American colonies, which were so ably composed that they were attributed to John Jay. In 1774 he delivered a public address in behalf of the patriots that showed remarkable ability for a boy of seventeen, and later published a number of circulars relative to the American cause. He became captain of artillery at the beginning of the Revolution, was appointed a member of Washington's staff in 1777, and rendered valuable aid as a friend and adviser. In December, 1780, he married Elizabeth Schuyler, daughter of General Schuyler, and in 1781 resigned his membership on the staff. After the war closed he studied law, served in the continental congress in 1782-83, and rose to eminence at the New York bar.

ALEXANDER HAMILTON.

In 1787, Hamilton served as a leader at the constitutional convention in Philadelphia, where he advocated a strong central government, but accepted the constitution agreed upon, and by voice and pen supported that document, defining its scope and power before the people. His papers on the constitution were published under the title of "The Federalist," and of the eighty-five issues that appeared fifty-one were from his pen. The convention which met in New York in 1788 to consider the constitution was at first opposed to ratification by a two-thirds majority, but this was reduced to a minority by his able advocacy. Washington selected him as secretary of the treasury in 1789, in which position he displayed rare ability in raising the public credit and placing the nation on a stable financial basis. In the cabinet he was confronted by Jefferson, who differed from him in the construction placed on the constitution, which led Hamilton to resign his office in 1795, but he became an active and influential leader of the federal party. He wrote the famous "Camillus" letters in defense of the Jay Treaty, advised Washington in preparing the address of farewell, and was personally opposed to President Adams. Political differences with Aaron Burr brought on a duel with the latter at Weehawken, New Jersey, July 11, 1804, and he died the following day from the effect of the wound he received. Hamilton ranks in history among the most brilliant statesmen of America, being remarkable alike for his extraordinary genius and ability to organize.

HAMLIN, Hannibal, statesman, born in Paris, Maine, Aug. 27, 1809; died in Bangor, July 4, 1891. He began his career as a printer, was admitted to the bar in 1838, served in the legislature in 1836-40, and again in 1847. In 1842-44 he was a member of the national congress, and in 1848-57 held a seat in the United States senate. Up to 1856 he was a democrat, but in that year he aided in organizing the republican party, being in favor of the immediate abolition of slavery. In 1860 he was elected vice-president of the United States, serving with Lincoln in 1861-65. President Johnson appointed him collector of customs at Boston. He was United States senator in 1869-81, and in 1881-82 was minister to Spain.

HAMMOND (hăm′ǫnd), a city of Lake county, Indiana, three miles from Lake Michigan, and twenty miles southeast of Chicago. It is noted for its extensive railroad connections, nail-mills, slaughter-house, starch works, packing establishments, and foundries. The city has electric lights and street railways, pavements, waterworks, several fine schools and educational institutions, and numerous churches. Many of the highways adjacent to the city have been finely macadamized. It is the seat of the printing establishment of the W. B. Conkey

Company, one of the largest in America. Population, 1900, 12,376.

HAMMOND, John Hayes, mining engineer, born in California in 1857, and educated at Yale and Freiburg, Germany. In 1880 he secured an appointment in the department of mining and mineral statistics, California, and shortly after became mine superintendent in Mexico. In 1893 he was made expert mining adviser to Abraham Barnato, the largest mine owner of South Africa. He was one of the leaders of the uitlander reform agitation regarding the Transvaal, and, after the celebrated Jameson raid, was arrested on a charge of high treason. On April 27, 1896, he was sentenced to be hanged, but this was immediately commuted to imprisonment for fifteen years. Later the sentence was changed to a cash fine of $125,000 and banishment, after which Hammond went to England and gave testimony regarding the Jameson raid before a commission of parliament.

HAMMOND, William Alexander, physician, born in Annapolis, Maryland, Aug. 28, 1828; died Jan. 5, 1900. He graduated from the University of New York as doctor of medicine in 1848, and served in the United States army as assistant surgeon from 1849 to 1860, when he resigned to accept a professorship of anatomy and physiology in the University of Maryland. He entered the army at the beginning of the Civil War, and was made surgeon-general in 1862 with the rank of brigadier-general. Later he was dismissed from service on account of charges of irregularities in liquor contracts, but afterward was restored to full rank by the president and congress. In 1867 he became professor in Bellevue Hospital Medical College, and lectured extensively on diseases of the nervous system in various important institutions of learning. Among his published works are "Sleep and Its Derangements;" "Treatise on Hygiene;" "Strong-minded Women;" "Diseases of the Nervous System;" "Physiological Memoirs," and "On the Susquehanna."

HAMPDEN (hămp'dĕn), **John,** statesman, born in London, England, in 1594; died June 24, 1643. He descended from prominent ancestors, was related to Cromwell, and when but three years of age his father, William Hampden, died. In 1609 he entered Oxford as a student, inherited ample means from his father's estate, and in 1621 was elected to parliament, serving there three terms consecutively. In parliament he took a prominent part, though not as an orator, but was influential because of his considerate judgment and force of character. With much decision he opposed the designs of Charles I. in his tax measures, was influential as a leader in the long parliament, and with four others precipitated civil war by attempting to seize King Charles on Jan. 4, 1642. The hostilities that followed received his personal and financial support, and he displayed superior generalship and marked bravery in behalf of the parliamentary army. In the battle of Chalgrove Field, fought June 18, 1643, he was fatally wounded while leading a gallant charge, and died six days later. Hampden is mentioned by Macaulay as a capable soldier and statesman, and as giving promise of becoming the Washington that would establish a just government in England, had he not been cut short in battle.

HAMPTON ROADS, the name of an inlet from Chesapeake Bay, in Virginia, forming the mouth of the James River. On the northern shore is Fortress Monroe, which on March 8, 1862, was the scene of an important naval battle between the Confederate ironclad Virginia, previously called the Merrimac, and the Union vessels Congress and Cumberland, which resulted in the destruction of the latter two. On the following day the Monitor, a Union ironclad of a new type, appeared on the scene of battle, and after a fight of four hours compelled the Virginia to withdraw.

HAMPTON, Wade, soldier and statesman, born in Charleston, South Carolina, March 28, 1818; died April 11, 1902. He studied at the South Carolina University, and in 1861 opposed secession in the state legislature. When the war began, he raised the "Hampton Legion," a body of cavalry, infantry, and artillery that rendered efficient aid to the Confederate cause. During the service he rose from private to lieutenant-general, commanded the cavalry under General Lee, and later under Johnston. In 1878 he was elected governor of South Carolina. He served as United States senator with much ability in 1879-91, and in 1893 was appointed United States commissioner of railroads. Hampton takes high rank among the legislators and public men of the southern states.

HAMSTER, a genus of rodent animals closely allied to the rat, but belonging to the family of mice, and found extensively in northern Eurasia. They are from eight to twelve inches long, tail about three inches, and distinguished by having cheek-pouches. The food consists chiefly of cereals, vegetables, and other forms of plant growth. Several of the American species are noted for carrying corn and other seeds into their subterranean abodes for use as food in the winter.

HANCOCK, John, statesman, born in Quincy, Mass., Jan. 12, 1737; died Oct. 8, 1793. An estate inherited from an uncle enabled him to pursue the mercantile business, an occupation in which he became successful and amassed a large fortune. From 1766 to 1772 he served as a member of the Massachusetts legislature, and there showed early tendencies toward a spirit of liberty. When the British attempted to seize his ship Liberty, a riot followed, and he was one of several commissioners who demanded that the British troops be removed from

Boston after the Boston Massacre. He was elected to the provincial congress in 1774, and, when the proclamation of Governor Gage was issued in 1775, all revolutionists were promised pardon except Hancock and Samuel Adams. In 1775-80 and 1785-86 he represented Massachusetts in the continental congress, was president of that body in 1775-77, and his name stands first as a signer of the Declaration of Independence. During the Revolution he was major-general, became first governor of Massachusetts in 1780, a position he held until 1792, except two years intervening, and in 1789 received four electoral votes for president. Hancock was a courtly and pleasing man, possessed a strong and popular character, and showed much liberality in using his large fortune for benevolent purposes.

JOHN HANCOCK.

HANCOCK, Winfield Scott, celebrated soldier, burn in Montgomery county, Pennsylvania, Feb. 14, 1824; died Dec. 9, 1886. In 1844 he graduated from West Point, rendered distinguished services in Scott's campaign in Mexico, and did frontier duty until 1861, when he was appointed brigadier-general of volunteers, commanding in the army of the Potomac. His services to the Union cause at South Mountain and Antietam were efficient, and caused his promotion to the rank of major-general, and in 1863 he was rewarded by a command in the second corps for distinguished bravery at Fredericksburg and Chancellorsville. At Gettysburg he won his greatest laurels by marked efficiency, and at the moment of victory was severely wounded, but remained on the field until his corps repulsed the desperate charge led by General Pickett. His bravery was recognized in a vote of thanks by congress. Early in 1864 he returned to take command of his corps, and distinguished himself at the Wilderness, Spottsylvania, Cold Harbor, and Petersburg. In 1864 he was made brigadier-general in the regular army, and after the close of the war commanded various departments, securing a promotion to the rank of major-general in 1866. His position during the period of reconstruction and particularly several orders issued in 1867, in which he declared military power is intended not to control, but uphold civil power, brought him prominently before the country in 1880 as the democratic candidate for the presidency. However, he was defeated in the election by General Garfield, but retained the warm regard of the people. Subsequently he continued as senior major-general of the army, directing the department of the Atlantic. As a general he stands among the bravest and most fearless of America, being noted alike for his manliness and devotion to country. General Grant said of him, "Hancock stands the most conspicuous figure of all the general officers who did not exercise a separate command." In 1885 he was chief commander at Grant's military funeral.

HAND, the part of the fore-limb that is attached to the lower extremity of the forearm, and is adapted for grasping. It is possessed by man, apes, monkeys, and lemurs, but in its perfection belongs only to man. The hand of apes and kindred animals serves partly for prehension and grasping, and to some extent it is necessary for support and locomotion. There are twenty-seven bones in the human hand. In the wrist are eight separate bones, called the carpal, consisting of two rows, each containing four bones. The five bones of the inner hand and lower part of the thumb are called metacarpal, while in the fingers and thumb are fourteen bones, three in each finger and two in the thumb, these being known as the phalanges. The thumb, standing apart from the rest, possesses a well known freedom of motion, and is thereby especially useful in seizing and grasping when brought in contact with the fingers. The outer phalanges form hinge joints, but the first bone of each finger is attached to the corresponding metacarpal bone so as to be movable in several directions. Fingers are named in order—the little, ring, middle, and index finger, and the thumb. When closed, they fit the hollow of the hand, and are thus capable of more easily grasping objects of varying size. When clasping a ball, the tips of the fingers are in a straight line. All parts of the hand are supplied with strong ligaments and muscles, thereby giving much freedom of motion, elasticity, and power of activity in numerous directions and for a great diversity of purposes. Artists have studied the elegance of outline, beauty of color, and delicacy of mold in the human hand, while its extraordinary mobility and adaptation to various uses have led many philosophers to attribute superiority to man fully as much on account of the hand as for his higher intellectual powers. The numerous nerves of the hand and fingers give the latter a more acute sense of touch than is found in any other part of the body. In linear measure the hand is assumed to be four inches, and is frequently used in measuring the height of horses. Palmistry relates to the lines of the inner hand, and those who make it a study claim to be able to predict regarding the future.

HANDEL (hăn'-del), **George Frederick,** musician and composer, born in Halle on the Saale, Germany, Feb. 23, 1635; died April 14, 1759. He was the son of a court

surgeon in Brandenburg, and at a very early age exhibited natural tendencies toward musical accompliſhments. When seven years old he received instruction in Halle under Frederick Wilhelm Zachau, and when nine years of age was skilled in playing on the violin, organ, and a number of other instruments. In 1703 he went to Hamburg, where he played a violin in the operatic orchestra, and soon after became a musical director. His first opera was "Almira," which appeared in 1705, and soon after he produced "Nero" and "Florinda." In 1707 he visited Italy, where he composed "Rodrigo." His "Agrippina" was played for thirteen nights in Venice. He returned to Germany in 1710, and while there was appointed chapel master to the elector of Hanover, afterward George I. of England, under whom he afterward received preferment in London. The Royal Academy was founded in the Haymarket, in 1720, with the special view of performing the operas of Handel under his personal direction. He remained seventeen years in London, producing many of his well known operas, but in 1837 his management and composing were interrupted by a severe impairment of his health. After careful treatment he partially recovered physical strength, and again wrote numerous oratorios. In 1752 he lost his sight, but subsequently composed and played on various instruments. Among his most celebrated and best known productions, besides those already named, are "Atalanta;" "Pastor Fido;" "Israel in Egypt;" "Alexander's Feast;" "Sampson;" "Ode for St. Cecilia's Day;" "Messiah;" "Esther;" "Deborah," and "Jephthah," the last of his oratorios. Handel had few equals as a musician and composer, his productions showing much grandeur and sublimity, and holding a rank in music equal to the place accorded Schiller and Goethe in literature. "Atalanta" is considered his greatest musical composition; it has hardly a parallel in musical history.

GEO. F. HANDEL.

HANG-CHOW (häng'chow), an important city in China, capital of the province of Chekiang, on the Tsien-tang River, at the place where it flows into Hang-chow Bay. The city contains the most beautiful monuments, temples, and edifices of China. It also ranks as the most noted literary, religious, and commercial center, and is noted for its public improvements and well paved streets. Among its manufactures are silks, tapestry, furs, lacquered ware, carpets, porcelain, jewelry, fans, and machinery. Walls surround the older portion of the city, but the finest edifices are outside the walls, in the suburbs. At the time of its greatest prosperity it had a population of over 2,000,000. The Taipang rebellion of 1861 caused temporary decline, but it is rapidly gaining in population and industrial rank. Marco Polo visited the city in the 13th century, and described it as a center of much grandeur and wealth. Population, 850,000.

HANGING GARDENS, a structure built at Babylon and regarded among the seven wonders of the world. The construction of these gardens is attributed to Nebuchadnezzar about five centuries B. C., though others ascribe them as the work of Queen Semiramis, fully seven centuries earlier. Several historians who ascribe them to Nebuchadnezzar think they were built to gratify his Median queen, Amytis, for the purpose of making the plains of Babylonia less dreary to her when contrasted with the mountain scenery of her native land. The gardens covered an area of four acres, were supported on arches of masonry of terrace construction, and rose to a height of seventy-five feet. A reservoir at the top supplied water drawn from the Euphrates to the flowers, shrubs, and trees by artificial channels and fountains. Banqueting rooms were maintained in various parts of the gardens, and beautiful scenic walks and resting places were located at convenient places.

HANKOW (hän-kow'), a riverport city in China, at the junction of the Yang-tse-kiang and the Han River, in the province of Hupah. It is important as a commercial center, was opened to foreign trade in 1862, and is the chief industrial city in the green tea district. There are numerous factories, producing porcelain, clothing, jewelry, earthenware, and silks. It is reached by large steamers from the Yellow Sea. Population, 775,000.

HANLEY, a manufacturing city of Staffordshire, England, near Stoke-upon-Trent, about 148 miles northwest of London. It has excellent railroad and electric railway connections. There are good municipal facilities and several educational institutions. It is noted for its manufacture of chinaware, clothing, pottery, and machinery. Population, 55,638.

HANNA, Marcus Alonzo, capitalist and public man, born in Lisbon, Ohio, Sept. 24, 1837. After studying at the Western Reserve University, he entered the grocery business, and in 1867 became largely interested in the coal and iron industry. Being a man of sagacious business habits, his enterprises were highly profitable, yielding large returns, and he invested heavily in banking, railways, and shipbuilding. In 1896 he served as chairman of the republican national committee, in which capacity all his excellent ability as an organizer was brought into play, thus giving that party

the advantage of thorough organization. He was elected to the United States senate in 1898, in which capacity he was in close touch with the administration of President McKinley, and in 1900 again served as chairman in the presidential campaign. Hanna has been particularly identified with the movement in favor of a gold monetary standard and as an advocate of the ship subsidy bill. He died Feb. 15, 1904.

HANNIBAL (hăn'ĭ-bạl), or **Annibel**, Carthaginian general, son of Hamilcar Barca, born in 247 B. C.; died in Nicomedia, Bithynia, in 183. When only nine years of age he was taken by his father before an altar to swear eternal enmity against Rome, and immediately accompanied the army on the great campaigns led against Spain. After remaining nine years under the training of his father, he returned for a short time to Carthage, but rejoined the army in Spain at the age of twenty-two, and served under his brother-in-law, Hasdrubal. At the death of the latter, in 221 B. C., Hannibal was elected to the chief command by acclamation, and at once prepared to pursue the course of his father in fighting against the Romans within their own territory. With an army of 90,000 infantry, 12,000 cavalry, and forty elephants he started upon his famous march across the Pyrenees, the Rhone, and the Alps for the purpose of conquering Italy. It is thought that he crossed the Alps by the Little St. Bernard pass. His force was greatly diminished by hardships during the passage, particularly after crossing the Pyrenees, where he was met near the Rhone by a powerful army of Gauls, but these he defeated. Upon reaching the southern side of the Alps, his army consisted of only 30,000 men, a force much inferior to the powerful body of trained soldiers at the disposal of Rome. Near the Ticino River he was met by a Publius Scipio, who commanded a large Roman army, but with his superior Numidian cavalry he succeeded in defeating them in 218 B. C., driving the forces across the Po, and again winning a victory at Trebia.

HANNIBAL.

The next year Hannibal moved southward and defeated the Roman general Flaminius near Lake Trasimene, taking 15,000 prisoners. Soon after he invaded Apulia, where he spread terror, and by continued successes hastened the appointment of Fabius Maximus as Roman dictator. Fabius at once adopted the policy of harassing the enemy by cutting off its supplies, but skillfully avoiding a pitched battle. This course of warfare, though at first discouraging to his countrymen, was effective in causing the Carthaginian army to waste away by inactivity and disappointment. In the spring of 216 Hannibal posted his army, now largely increased, in the vicinity of Cannæ, and was attacked by the Roman army under Terantius Varro and Æmilius Paulis. The Carthaginian army was drawn up in the shape of a half moon with the convex side toward the enemy, and at the horns of the crescent was his Numidian cavalry. As the legions of Rome advanced upon the center it skillfully retreated, but, when they pressed forward in eager pursuit, the Carthaginian horsemen fell upon the Romans from every side, rendering them unable to either fight or flee. About 60,000 Romans were slain in the fearful massacre, among them twenty-one tribunes and eighty senators. Hannibal sent a bushel of gold rings to Carthage after the battle, these having been the ornaments of Roman knights. Within eighteen months fully one-fifth of the citizens able to bear arms had fallen and all southern Italy and Capua were compelled to join Hannibal. The campaigns of the succeeding three years were unimportant, though in 212 Hannibal seized Tarentum, but two armies were sent from Rome against Capua. As a measure of relief to Capua Hannibal conducted a powerful army to attack Rome in 211, but that city was retaken, and the Carthaginians fell back to Bruttium, where they were constantly confronted by superior numbers until 203, when Scipio invaded Carthage and Hannibal was recalled to defend his own country.

After expelling the Carthaginians from Spain, Scipio invaded Africa and defeated Hannibal at Zama in 202, thus ending the Second Punic War. Carthage was reduced and compelled to submit to the most humiliating conditions of peace, being prohibited from going to war without the permission of Rome. Subsequently Hannibal began the improvement of his capital and native country, reforming the administration and finance, and encouraging commercial intercourse. This caused much jealousy among the Romans, and Hannibal was compelled to flee to the court of Antiochus of Syria, where he engaged to assist in a war against Rome, but his expedition dispatched to attack the Rhodians with a Syrian fleet met disaster. He next fled to Bithynia, where he took refuge with King Prusias and gained several victories for that sovereign in battles against Roman allies. Later the Roman senate demanded the surrender of Hannibal, and, since Prusias was not able to protect him, he took poison to end his life. Viewed in the light of achievements under difficulties, Hannibal stands as the greatest military genius of the world.

HANNIBAL, a city of Missouri, in Marion county, on the Mississippi River, about

135 miles above St. Louis. It is supplied with electric street railways, electric lights, waterworks, and a public library of 12,000 volumes. Several important railroad lines center in the city, making it a convenient shipping point for lumber and agricultural products. In its vicinity are deposits of coal and limestone. Among the manufactures are flour, lime, pottery, machinery, tobacco, utensils, and railway cars. The city has fine public schools and churches, many excellent buildings, and is making rapid strides of growth in wealth. Population, 1900, 12,780.

HANOVER (hăn'ō-vẽr), a province of Prussia, situated in the northwestern part of the German Empire, having an area of 14,858 square miles. The surface is an undulating plain, with alluvial flats and moors in the northern portion. It is well watered by the Weser, Elbe, and Ems rivers and their numerous tributaries. Nearly one-half of the province is arable and about one-seventh is covered with timber. Farming and stock-raising are extensive industries, but there are also considerable interests in fruit culture and fishing. The mines yield vast quantities of copper, iron, lead, asphaltum, coal, zinc, and silver. Among the chief manufactures are clothing, canned fish, paper, glass, linen, woolen, and cotton goods, sugar, machinery, and musical instruments. The six administrative districts include Luneburg, Hanover, Stade, Hildesheim, Aurich, and Osnabruck. The province is penetrated by many important railroads, and is noted for its production of sugar beets. Hanover was formerly an independent kingdom, but, siding with Austria in 1866, it was annexed to Prussia in the same year. Göttingen is an important educational center, containing a noted university. Hanover is the capital. The province has a population of 2,676,860.

HANOVER, a city in Germany, capital of the province of Hanover, at the confluence of the Leine and Ihme rivers, sixty-four miles southeast of Bremen. It is noted for its beautiful streets, extensive railroad connections, and commercial importance. Among the manufactures are machinery, chemicals, cotton and woolen goods, tobacco and cigars, musical instruments, porcelain, and toys. Gas and electric lights, stone pavements, electric street railways, and fine churches are among the improvements. It is first mentioned in history in 1163, joined the Hanseatic League in 1481, and became the capital of Hanover in 1486. Its public schools, parks, and library have been noted for several centuries. Population, 242,613.

HANOVER, a town of New Hampshire, in Grafton county, on the Connecticut River, fifty-four miles northwest of Concord. It is noted for the Dartmouth College, which was established there in 1769, and is one of the important educational institutions of America. It has extensive courses of study, a library of 65,000 volumes, and with it are connected the State College of Agriculture, Chandler Scientific School, and the New Hampshire Medical College. Hanover is a beautiful place, having an advantageous site, scenic gardens, and many fine churches and residence buildings. Population, 1900, 1,884.

HANSEATIC LEAGUE (hăn'sē-ăt'ĭk lēg'), or **Hansa**, an association of certain German and adjacent cities formed in the 13th century for the purpose of mutual protection and development of commercial interests. The first steps in the direction were taken by Hamburg, Hadeln, and Ditmarsh in 1219 to protect themselves against pirates that infested the North Sea. In 1241 the city of Lübeck was added with the view of joining Hamburg in protecting travel on the highway across Holstein between the Baltic and the North Sea. Brunswick joined in 1247, when the general name applied to the league originated. During its most prosperous period the association included eighty-five cities, embracing both inland and maritime towns from Amsterdam to Reval, and from Cologne to Breslau and Cracow. Lübeck was recognized as the principal member, and was the meeting place of the deputies who governed the league. The association attained much political influence by supplying money and extending trade to various countries. As a safeguard and for mutual protection it maintained armies and navies, and also constructed canals, developed the principles of mercantile law, adopted a system of weights and measures, and made treaties with various countries to further commercial interests. In 1370 its army gained victories over the kings of Norway, Sweden, and Denmark, and for a time the association claimed the power to choose the sovereign of the latter country. Since the seaport cities possessed advantages over inland towns, the league began to lose power in the 16th century, and most of the countries with which it had treaties revoked them before the beginning of the 17th century. After 1628 the only cities to maintain an organization were Hamburg, Lübeck, and Bremen, but these were joined by Frankfort-on-Main in 1813. In 1866 Frankfort was incorporated with Prussia, and the other three became a part of the German Empire in 1870. Since 1889 these cities have belonged to the German customs union.

HAPSBURG, House of, the reigning dynasty of Austria. The name was derived from the castle of Hapsburg in the Swiss canton of Aargau, on the Aar River. Bishop Werner of Strasburg built the castle in 1027, and his successor, Werner II., was the first to assume the title of count of Hapsburg, about 1090. From him descended Albert, who is mentioned as count of Hapsburg in 1152, and Emperor Frederick I. appointed him landgrave of upper Alsace. The family attained to much power in Swabia under his son, Rudolph I., and in 1273 Rudolph,

son of Albert IV., secured the election as emperor of Germany, and became hereditary monarch of Austria in 1282. From him descended all the Hapsburg monarchs of Austria to Charles VI. With the marriage of Marie Theresa to Francis Stephen of Lorraine it became known as Hapsburg-Lorraine, and Francis II. assumed the title of emperor of Austria. The house of Hapsburg has furnished numerous sovereigns of Austria, Germany, and Spain, Francis Joseph I. being one of its most distinguished members.

HARBOR, a port for ships, natural or artificial, on the coast of a sea, lake, or other body of water. The importance of a harbor depends upon the depth of its water, freedom from breakers, and natural protection against storms. The United States has made liberal expenditures for the purpose of improving by dredging and otherwise the harbors of its ocean and lake coasts, and those situated in its most important streams. In many of them commodious docks have been constructed, whereby loading and unloading is facilitated by keeping the water surface practically at a common level.

HARBOR GRACE, a Newfoundland seaport, on the west coast of Conception Bay, and connected with the interior by railways. It has an important commercial trade, both inland and foreign. There is a spacious harbor, divers manufactures, and several fine schools. Population, 10,872.

HARCOURT (här'kŏrt), **Sir William George Granville Vernon**, statesman, born in Oxford, England, Oct. 14, 1827. He graduated from Cambridge in 1851, was called to the bar in 1854, and soon after became Queen's counselor. In 1858 he was elected to parliament as a liberal for the city of Oxford. He was appointed professor of international law at Cambridge in 1869, but resigned in 1873 to become solicitor-general in the Gladstone administration and was knighted. Politically he took an active part in defending the Irish home-rule policy of Gladstone, and for many years sat in the house of commons. As a speaker and writer he takes high rank, and is noted for his versatility in economical and financial subjects. A number of contributions to the "London Saturday Riview" and "London Times" placed him before the people as an able student of economic questions. For many years he ranked as a leader of the liberal party.

HARDEE (här'dee), **William Joseph**, soldier, born in Savannah, Georgia, Oct. 10, 1815; died in Wytheville, Virginia, Nov. 6, 1873. In 1838 he graduated at West Point, studied for some time in France, and served with distinction in the Mexican War. At the outbreak of the Civil War he joined the Confederate army with the rank of colonel, and took part in the battles of Shiloh, Murfreesboro, Chattanooga, Savannah, and Charleston. His distinguished services won promotion to the rank of lieutenant-general. He is author of Hardee's "Tactics," a work adopted for use in the army and militia of the United States.

HARDY, Thomas, novelist, born in Dorsetshire, England, June 2, 1840. He graduated at King's College, became interested in literature, and in 1872 published "Desperate Remedies." Later he produced many excellent novels of literary value written in a beautiful narrative style. Among his best known productions are "Under the Greenwood Tree;" "Wessex Tales;" "Life's Little Ironies;" "Three Wayfarers," and "Jude the Obscure."

HARE, a class of rodent quadrupeds belonging to the genus lepus, characterized by a short tail, long ears, cleft upper lip, and long hind legs. Hares are similar to rabbits in all general respects, but differ from them

HARE.

in that the latter are inclined to burrow more extensively and show more sociability in living in families, while hares are solitary and prefer to find an abode in grasses and underbrush. There are about forty species, fully half of which are indigenous to America. The polar hares of North America are noted for their pure white color in winter and large size, while the prairie hares, a class embracing the jack-rabbits, are distinguished for their large body and long limbs. The timidity of these animals is proverbial, though their lack of courage and cunning is overcome largely by marked acuteness of hearing and sight and by their remarkable swiftness in leaping and running. Most species lie secluded during the day and come out at twilight in search of food, which consists mainly of green vegetation, roots, and the bark of trees, but in populated districts they feed also on cereals. The voice somewhat resembles that of a child, but it is never heard except when wounded or seized. The flesh is prized as an article of food, but it is much more valuable during the fall and winter than in the summer season. It is

rare sport to pursue the hare, especially after a light fall of snow, when it may be tracked to its place of hiding. The fur of hares enters into the manufacture of hats, and is used to a limited extent for linings and garments.

HAREM (hā'rĕm), the set of apartments reserved for the female members of a Mohammedan family, and at which all males are forbidden entrance, except the husband and near relatives. Harems are maintained only by the richer Moslems, and in them the wives, concubines, and children have their abode, being attended by female slaves and eunuchs. The inmates spend their lives largely in dressing, bathing, pleasurable occupations, and in the society of other Turkish women. It is commonly reported that the sultan of Turkey maintains the greatest harem in the world, most of his women being Circassians and Georgians. The apartments occupied by them are of magnificent architecture and contain elaborate decorations and furniture. At the time of the Spanish-American War much interest centered in the sultan of the Sulu Islands, one of the Philippines, who maintained a harem of considerable size.

HARGREAVES (har'greevz), **James**, inventor, born near Blackburn, England, in 1720; died April 22, 1778. He invented the carding-machine in 1760, an apparatus that superseded hand-cards, and a few years later constructed the spinning jenny, which enabled him to spin successfully with several spindles at a time. The large amount of yarn produced in his dwelling caused workmen to suspect his invention, and accordingly they forced an entrance and destroyed the machine, causing Hargreaves to remove to Nottingham. A patent was issued to him in 1770, but it was afterward held invalid because he had sold several machines before obtaining it. However, he became an extensive manufacturer, and a moderate reward was granted his family by the government for the benefit his invention proved to the country.

HARLAN, James, statesman, born in Clark County, Illinois, Feb. 25, 1820; died in Mt. Pleasant, Iowa, Oct. 5, 1899. He graduated at Indiana Asbury College in 1845, two years later became superintendent of public instruction for Iowa, and in 1853 was made president of the Iowa Wesleyan University. In 1855 he was elected to the United States senate, and was re-elected in 1861 and again in 1866. President Lincoln appointed him secretary of the interior in 1865, but he resigned this position when elected to the senate in 1866. In 1869 he was elected president of the Iowa University, where he rendered efficient services.

HARLAN, John Marshall, jurist, born in Boyle county, Kentucky, June 1, 1833. He graduated at Central College in 1850, was admitted to the bar in 1853, and served as colonel in the Union army from 1861 till 1863, when he became attorney-general for his state. President Hayes appointed him associate justice of the United States supreme court in 1877, by virtue of which position he was a member of the commission to settle the Bering Sea dispute in 1892.

HARMAR, Josiah, soldier, born in Philadelphia, Penn., in 1753, died there Aug. 20, 1813. He was brought up as a Quaker, served as lieutenant-colonel in the Revolutionary army from 1776 till 1782, and was brevetted colonel the following year. In 1783 he carried the ratification of the final treaty with England to France, by which American independence was established. In 1789 he was made general-in-chief of the United States army, and distinguished himself in an expedition against the Miami Indians.

HARMONICS (här-mŏn'iks), in music, the attendant or secondary tones produced by the vibration in aliquot parts of the same body or string that gives, by its complete simultaneous vibration, the primary or fundamental tones, also called over-tones. The vibration of a piano is so regulated that higher harmonics than the seven are not present. Harmonics serve to modify tones and give them their distinctive quality or timbre, and may be detected without difficulty by the practiced ear.

HAROLD (hăr'ọld), the name of four kings of Norway, who reigned between 863 and 1136, and of whom Harold III. is the most noted. He was the son of Jarl Sigurd, by whom he descended from Harold I. At an early age he joined the Varangian guard at Constantinople, took a prominent part against the African pirates in Sicily and Italy, and was appointed commander of the body-guard which defeated the Saracens. In 1042 he returned to Norway, three years later came to an understanding with his relative Swend of Denmark, and in 1047 succeeded Magnus the Good as king. In 1066 he sailed for England with an immense fleet for the purpose of assisting Tostig, brother of Harold II., king of England, in an invasion of that country, but at the battle of Stamford Bridge the allied army and navy were defeated and both he and Tostig were slain.

HAROLD, the name of two Danish kings of England, who reigned between 1035 and 1066. Harold I., surnamed Harefoot, succeeded his father in 1035 as sovereign of the provinces north of the Thames, and in the same year became king of England, being elected to succeed Canute. He died in Oxford, March 17, 1040. Harold II. was the son of the earl of Godwin and his Danish wife, Gytha, and in 1053 succeeded his father as earl of the West Saxons. After the death of King Edward, in 1066, Harold was crowned, and immediately organized offensive and defensive forces to repel the invasions of Tostig and Harold III. of Norway, the latter claiming the throne of England on

account of Harold II. having descended from the Danish in the female line. A fierce and bloody struggle ensued at Stamford Bridge on Sept. 25, in which Tostig and Harold III. were killed. Three days later the duke of Normandy landed at Bulverhithe, and on Oct. 14 defeated Harold II. in the battle of Hastings, in which the latter was slain. Harold fought heroically for the crown of England, and is made the subject of a drama by Tennyson and of a novel by Bulwer-Lytton.

HAROUN-AL-RASCHID (hä-roon'-äl-răsh'id), celebrated caliph of the Saracens, born in Rei, March 20, 763 A. D.; died in Tus in March, 809. He ascended the throne of Bagdad when twenty-two years of age, and at once became famous for the hospitality and benevolence of his court. His scholarship and ability as a poet made Bagdad the center of Moslem learning and art. However, the latter part of his reign was characterized by cruelty and oppression. In 803 he caused four of his sons, who had been entrusted largely with the government, and several other relatives and officials to be put to death. His death occurred while attempting to suppress a rebellion that had become widespread in his kingdom. He became known in history as Haroun the Magnificent, and his fame is evinced by the Arabian Nights' Entertainments, though these attribute too much goodness to him.

HARP, a stringed instrument of triangular form. It is of great antiquity. The sculptures and ruins of the Egyptians and Syrians give evidence that it was a favorite

ANCIENT EGYPTIAN HARPS.

instrument among them. It is also mentioned at numerous places in the Scriptures, and continued in popular favor among the Greeks, Romans, and various peoples of western Europe. Those used in ancient times were about seven feet high, and, like those of more modern manufacture, were furnished with gut strings. The harp mentioned in the Bible was somewhat smaller and could be carried easily from place to place by strolling musicians. In western Europe the harps were similar to those of Eastern peoples, and formed a popular musical accessory for many centuries. The Italian harp, a kind popular in Italy several centuries ago, is rarely used at present, and the triangular harp of mediæval construction has also gone out of general use. The so-called pedal harp, in which pedals are utilized to raise the pitch of all the strings chromatically, is the one now generally preferred. A harp on this plan was patented in 1810. It is provided with seven pedals, contains forty-three strings tuned according to the diatonic scale, and may be readily adjusted to produce beautiful and diversified tones.

HARPER, William Rainey, educator, born in New Concord, Ohio, July 26, 1856 He was educated at the Presbyterian college of his native town, studied at Yale University, and in 1879 became professor of Semitic languages in the Baptist Union Seminary near Chicago. From 1886 to 1891 he was professor of Semitic languages in Yale, and in the latter year was chosen president of the University of Chicago, with the professorship of Semitic literature. Dr. Harper secured several million dollars as endowments for that institution, established a high reputation by his discriminating and tireless efforts, and added a splendid system of post-graduate work. He also attained to a wide reputation as Chautauquan lecturer, and is the author of several important publications. His writings include several text-books widely used in higher work. He edited the "Old and New Testament Student" and "Hebraica."

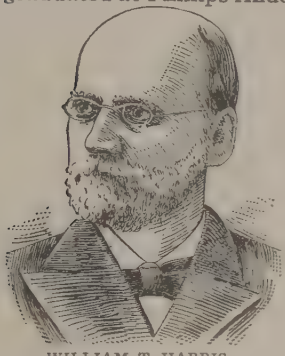
HARPER'S FERRY, a town of Jefferson county, West Virginia, at the confluence of the Potomac and Shenandoah rivers, about forty-five miles northwest of Washington. It is celebrated on account of the historic raid made by John Brown in 1859 for the purpose of forcibly liberating the slaves, and also because of the surrender of 11,000 Union men, in 1862, to Stonewall Jackson. The town has good railroad connections, is the seat of Stover College for Colored Youth, and manufactures tobacco and machinery. The surrounding country is fertile, producing large quantities of tobacco and cereals. Population, 1900, 896.

HARPIES (här'pīz), in Greek mythology, three female divinities called Ællon, Ocypete, and Celæno, and employed by the gods for the punishment of the guilty. The poems of Homer mention them as storms, and ascribe to them a flight more rapid than that of birds, or even the winds. In statuary they are represented with the head of a fair-haired lady and the body of a vulture, and appear to be affected by insatiable hunger, which caused them to rob their victims of food and otherwise afflict them.

HARPSICHORD (härp'sĭ-kôrd), a stringed instrument with a keyboard somewhat resembling a modern pianoforte, and now largely superseded by it. A superior kind of harpsichord had two keyboards, one for producing the soft notes, and the other the louder tones. They contained stops for modifying the tones, being thereby rendered suitable for different classes of music. The sounds were produced by the keys raising oblong slips of

wood, called jacks, which were supplied with appendages that struck the wires in a manner quite similar to the hammers used in the modern pianoforte.

HARRIS, William Torrey, educator, born in Killingly, Conn., Sept. 10, 1835. He graduated at Phillips Andover Academy and Yale, served as superintendent of public schools at St. Louis in 1868-80, and in the latter year represented the United States at the Brussels congress of educators. Subsequently he held many positions of honor. President Harrison appointed him commissioner of education, in which position he continued during the incumbency of President Cleveland and the administrations of Presidents McKinley and Roosevelt. He attained to high rank as a lecturer and writer on educational subjects. Besides publishing numerous works and reports on educational topics, he edited an international educational series of books.



WILLIAM T. HARRIS.

HARRISBURG (hăr'ĭs-bûrg), an important city of Pennsylvania, capital of the state, county seat of Dauphin county, on the Susquehanna River. It has broad and regularly platted streets and many fine public buildings, among them the state capitol, arsenal, insane asylum, Roman Catholic cathedral, a state library of 75,000 volumes, and numerous beautiful churches. There are excellent public schools and other educational institutions. Its municipal facilities include a splendid system of electric railways, waterworks, pavements, and public parks. As a railroad and manufacturing center it holds high rank among American cities. The capital invested in manufactories aggregates $8,500,000; the products are valued at $12,500,000, and about 7,125 persons are employed. Its importance in manufacturing is to be attributed to large deposits of coal in the vicinity, and to its excellent transportation facilities by river navigation and railways. Among the manufactures are railroad engines and cars, hats, ironware, machinery, cotton and woolen goods, flour, shoes, pottery, silk textiles, musical instruments, and brooms. Its trade in lumber and grain is extensive. The city was founded by John Harris in 1785 and became the state capital in 1812. Population, 1900, 50,167.

HARRISON (hăr'ĭs-ŏn), a city of Hudson county, New Jersey, on the Passaic River opposite the city of Newark. It is the focus of several railroad and electric car lines The surrounding country is agricultural and fruit growing. Among the manufactures are cutlery, linoleum, thread, electric fixtures, wire, machinery, and clothing. There are gas and electric lighting, street railways, waterworks, and several fine schools, including a splendid high school. Population, 1900, 10,596.

HARRISON, Benjamin, twenty-third president of the United States, born in North Bend, Ohio, Aug. 20, 1833; died March 13, 1901. His father, John Scott Harrison, was the third son of General Harrison, ninth president of the United States, who was the third son of Benjamin Harrison, a signer of the Declaration of Independence. He attended school at College Hill, near Cincinnati, and in 1852 graduated at Miami University, in Oxford, Ohio. In 1853 he married Caroline Scott, studied law in Cincinnati, was admitted to the bar in 1854, and entered upon the practice of law in Indianapolis, Indiana, where he continued to reside. His first appointment was that of a crier in the federal court at a salary of $2.50 per day, and his earliest case at law was an action brought for burglary by Jonathan W. Gordon, which he won by making an eloquent plea. He was elected as a republican to the office of supreme court reporter of Indiana in 1860, but joined the army soon after the Civil War broke out, and in 1864 was again chosen state supreme court reporter by a large majority, though he did not resume his work in that position until after the war closed. He was made colonel in 1862 and led the 70th Indiana volunteers into the field, and was ordered to Bowling Green, Kentucky. His services in the army were distinguished at Resaca, Kenesaw Mountain, Peachtree Creek, and while with Sherman in the Atlanta campaign. When Atlanta was taken by Sherman in 1864, Colonel Harrison received his first furlough to visit home. Subsequently he took part in the battle of Nashville, and was commissioned brevet brigadier-general in 1865.

BENJAMIN HARRISON.

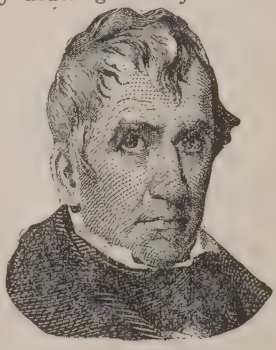
After the war Harrison returned to Indianapolis, resumed his office of reporter of the supreme court, and in 1867 devoted his attention to the practice of law. In the presidential campaigns of 1868 and 1872 he made vigorous canvasses in favor of General Grant, and in 1876 was defeated for governor, but ran fully 2,000 votes ahead of his associates. In 1879 he served as a member of the Mississippi River commission, supported James A. Garfield for president in 1880, and refused a cabinet position offered

him. In 1881-87 he served as a member of the United States senate, and there advocated civil service reform and the reconstruction of the navy. The republicans nominated him for president in 1888, and he received 233 of the electoral votes, 168 being cast for President Cleveland. In 1892 he was again nominated for president, but was defeated, receiving 145 electoral votes, while 276 were cast for Grover Cleveland. Among the principal events of his administration are the Pan-American congress at Washington, held for the promotion of commercial relations between the North and South American republics; the Bering Sea fishery dispute with Great Britain; the suppression of the Louisiana Lottery; the adoption of the McKinley tariff bill; the establishment of Blaine's reciprocity policy, and the settlement of Chilean and Samoan difficulties. After retiring from the presidency, he resumed his law practice at Indianapolis, and wrote and lectured extensively on jurisprudence.

HARRISON, Carter Henry, public man, born in Chicago, Illinois, April 23, 1860. He studied in the public schools of Chicago and at the Altenburg Gymnasium in Germany, and graduated from Yale Law School in 1883. Soon after he engaged in the practice of law in Chicago, in which he continued until 1889, and subsequently published the "Chicago Times." In 1897 he was elected mayor of Chicago, and re-elected in 1899 and in 1901. Harrison merits mention because of his reform movements in municipal government and ability as a public speaker. He came prominently before the country as an advocate of the election of Bryan for president. His father, Carter Henry Harrison, was mayor of Chicago for five terms, and was assassinated Oct. 30, 1893, by a disappointed applicant for office.

HARRISON, Constance Cary, authoress, born near Alexandria, Virginia, April 25, 1845. She was educated in the private schools of Virginia. In 1867 she married Burton Harrison, who had been Jefferson Davis' private secretary. Her magazine articles and promiscuous writings take very high rank on account of her keen appreciation of domestic themes, and excellent ability to narrate in an interesting style. Among her best known writings are "Anglomaniacs;" "Sweet Bells Out of Tune;" "Bachelor Maid;" "Errant Wooing;" "Daughter of the South," and "Flower de Hundred."

HARRISON, William Henry, ninth president of the United States, born in Berkeley, Virginia, Feb. 9, 1773; died April 4, 1841. He was the third son of Benjamin Harrison, a signer of the Declaration of Independence, and grandfather of Benjamin Harrison, twenty-third president of the United States. He entered upon the study of medicine, after attending Hampden-Sidney College, but was induced to enter the army because of Indian outrages on the western frontier, receiving a commission for the service in 1791. The next year he was appointed lieutenant and in 1794 distinguished himself by much gallantry on the Miami. In 1797 he was made captain and given command of Fort Washington, and while there married Anna Symes. When peace was declared in 1798, he resigned his commission, and in 1799 became a delegate to congress from the Northwest Territory. When Indiana Territory was formed, in 1800, which included the present states of Michigan, Indiana, Illinois, and Wisconsin, he was appointed its governor and superintendent of Indian affairs, and continued in these positions under appointments by Presidents Jefferson and Madison. During his time of service he organized the legislature at Vincennes in 1805; acquired by purchase large tracts of land for the government, and established a military post at Tippecanoe on account of Indian depredations committed in 1811. On Nov. 7, 1811, he quelled an outbreak under Tecumseh, which ended in a battle at Tippecanoe; hence he became known as the "Hero of Tippecanoe."



WM. H. HARRISON.

In 1812 Harrison was commissioned brigadier-general in the regular army, and later made commander-in-chief of the northwestern army, in which position he rendered valuable services during the War of 1812 by repulsing General Proctor at Fort Meigs, and also by assisting Commodore Perry on Lake Erie. On Oct. 5, 1813, he routed the British and Indians in the Battle of the Thames, for which he was highly complimented by President Madison. He resigned his commission in 1814 and was elected to congress two years later, serving in the lower house till 1819. In the same year he was chosen to the senate of Ohio, was a presidential elector in 1824, voting for Henry Clay, and in that year was elected to the United States senate. President John Quincy Adams appointed him minister to Colombia in 1828, but he was recalled by President Jackson in 1829, and for twelve years served as county clerk in Ohio. The whigs nominated him for president in 1836, but he was defeated by Martin Van Buren, receiving only seventy-three electoral votes, while his opponent received 170. The whigs nominated him again in 1840, when 234 electoral votes were cast for him and sixty for Martin Van Buren. He died one month after his inauguration and was succeeded in the presidency by John Tyler, the vice-president.

HART, Joel T., sculptor, born in Clark

county, Kentucky, in 1810; died in Florence, Italy, March 1, 1877. He was self-educated, began to model busts in clay while earning a living as stone-cutter in Lexington, and first attracted attention by preparing likenesses. The citizens raised a fund and sent him to Rome, where, in 1849, he modeled a statue of Henry Clay, a production now in the capitol square at Richmond, Virginia. Other well known works are a colossal bronze statue of Henry Clay, now in New Orleans, and a fine marble statue in the courthouse at Louisville, Kentucky. His productions show delicacy of touch and refined fancy. Many of them are idealistic and present a characteristic and truthful likeness of the subjects after which they are modeled. The latter portion of his life was spent in Italy, where he produced many wonderful pieces of art.

HARTE, Francis Bret, novelist and poet, born in Albany, New York, Aug. 25, 1839. Being the son of a school teacher, he at first designed to follow that profession. In 1854 he went to California and engaged in mining, but subsequently became a compositor in a printing office. His ability as a writer soon made a place for him as editor of the "Golden Era," and in 1868 he founded the "Overland Monthly," publishing among others his famous "Heathen Chinee;" "Luck of Roaring Camp;" "Society Upon the Stanislaus;" "Outcasts of Poker Flat," and "Truthful James." The success of these productions brought him into public notice, and he soon became a favorite contributor to the "Atlantic Monthly." Soon after he settled for a time in New York, but was appointed consul at Crefeld, Germany, and in 1880 made consul at Glasgow, Scotland. While in Britain he never tired of making literary research, producing many popular works, his later writings being largely in the line of fiction. Among those not already named are "Tales of the Argonauts;" "Crusade of the Excelsior;" "Waif of the Plains;" "Ward of the Golden Gate;" "Thankful Blossom;" "John Burns of Gettysburg;" "In a Hollow of the Hills;" "Dickens in Camp," and "Sappho of Green Springs." He died May 5, 1902.

HARTFORD (härt'ford), capital of Connecticut, county seat of Hartford county, on the Connecticut River, about fifty miles above its mouth. In 1633 the Dutch built a fort on its site, and in 1635 a colony settled there from Massachusetts. It was incorporated as a city in 1734, and until 1873 was the joint capital of the state with New Haven, but in that year became sole capital. It has regularly platted streets, excellent public and private buildings, and is well connected by numerous railroads and electric car lines. Besides having a fine state capitol, it is the seat of asylums for orphans, for the insane, and for the deaf and dumb, and contains several theological seminaries and hospitals. Trinity College, an Episcopal institution, is located near the city, while its public school system is ample for the general education of the young. The library of Trinity College includes 50,000 volumes, and, besides it, there are several other libraries. There are manufactures of sewing machines, silk and woolen goods, firearms, vehicles, machinery, hardware, flour, bicycles, stoves, and furniture. Among the sights of interest shown visitors for a number of years was the celebrated Charter Oak, the tree in which the charter of Connecticut was hidden when Governor Andros demanded its surrender. Population, 1900, 79,850.

HARTFORD CITY, county seat of Blackford county, Indiana, forty miles south of Fort Wayne. It is at the converging center of several railroads, has a fine courthouse, numerous school buildings, and a considerable trade. There are manufactures of flour, paper, glass, vehicles, and machinery. Electric lights, telephones, waterworks, and a library are among the facilities. Population, 1900, 5,912.

HARTFORD CONVENTION, an association of delegates proposed by the Massachusetts legislature. It convened at Hartford, Conn., Dec. 15, 1814, and adjourned Jan. 5, 1815. The federalists of the New England states opposed the war with Great Britain, which was then in progress. The war was especially injurious to the interests of New England because it operated to destroy the commercial importance and the fisheries of that region. The object of the convention was to devise means for security that would prevent total destruction, but it met behind closed doors, and was carefully watched by a government military officer. From time to time the conclusions of the convention were published in the form of measures looking to the protection of the citizens against compulsory military service, but there was a widespread suspicion that the members of the convention designed to disseminate a sentiment favorable to the establishment of a kingdom in New England. Since the delegates consisted of leading federalists who had favored an eastern confederacy in 1804, and the work of the convention was designed against the democratic administration, public sentiment formed largely against the federalists and entirely ruined them as a party in the election of 1816. Subsequently it was shown conclusively that the reports of treason were not well founded, and that the delegates had in mind only the interests of their section of the Union.

HARTSHORN, a volatile preparation of ammonia now obtained from a liquor and other sources, but formerly prepared from the horn of the common stag. It is employed for many purposes in medicine, especially in cases of fainting and nervous weakness. The scent is very strong, serving as a relief in headache.

HARVARD UNIVERSITY, an important institution of learning, situated in Cambridge, Mass. It was founded under an appropriation of $2,000 voted by the general court of the Massachusetts Bay colony, and established on Oct. 28, 1636, being thus the oldest university in the United States. No material advancement was made until 1638, when John Harvard bequeathed half his estate valued at $4,000 and his library of 300 volumes to the proposed institution. In the same year it was organized with its present name. Henry Dunster, the first president, succeeded in obtaining a legal charter on May 31, 1650. This document was signed by Gov. Thomas Dudley, and is now in the custody of the trustees. At present there are about twenty-five college buildings, an endowment fund of $13,500,000, and a library containing 590,800 volumes and 485,500 pamphlets. The instructors include 512 teachers and professors; students, 4,250, and the curriculum is both thorough and diversified. The courses include those of law, divinity, medicine, zoology, veterinary, dental science, and liberal arts. In connection with it is a college of liberal arts for women. The laboratories and observatory are thoroughly equipped. Its museum of comparative zoology is known as the Agassiz Museum, from the circumstance that it was endowed by Professor Agassiz.

HARVESTING MACHINERY, the implements used in harvesting the crops of agriculturalists. The first machines of this character known in history were used by the Gauls before the Christian Era, and consisted of a box fixed on wheels, with a cutting apparatus in front that gathered the heads of standing grain as an ox pushed the machine from the rear. At present three principal classes of machines are used for harvesting small grain. These are known as headers, reapers, and harvesters. Headers are utilized for cutting the heads of standing cereals, as wheat and oats, and some of the more modern structures thresh and bag the grain while the machine is propelled forward, though in most cases the heads are gathered and threshed afterward. In reapers the grain is cut, bound by hand, and, after being stacked or stored in barns, is threshed by machines. Harvesters consist either of self-binders, which bind the grain and carry the bundles into rows upon the field, or machines on which two men bind the grain by hand, though the latter form has gone practically out of use. Besides the implements employed in harvesting small grains, there are numerous machines for cutting grass, clover, and corn.

Among the earliest of the modern machines were those of Patrick Bell, who patented a harvester in Scotland in 1826, and the machine invented by Cyrus H. McCormick in the United States in 1834. Since then various excellent implements have been manufactured for many kinds of harvesting with the result that all classes of farming have become more profitable. There is also the advantage that it may be carried on with much less physical exertion. As a consequence agricultural enterprises have been extended over vast areas formerly not cultivated. In the manufacture of harvesting machines the United States has long occupied the foremost position. Its products have gone into all the markets of the world. The machines of newer manufacture are almost exclusively of steel, which has been made serviceable because of improved methods of tempering metals. The improvements due to the general use of ball-bearings has greatly lightened the draft of machines on the one hand and increased their durability on the other.

HARVEY, William, discoverer of the circulation of the blood, born in Kent, England, April 1, 1578, died in London, June 3, 1657. He attended the Canterbury grammar school until 1594, graduated at Cambridge in 1597, and in 1602 was granted a doctor's degree at the University of Padua. After returning to England, he settled in London, where he was appointed physician of St. Bartholomew's Hospital in 1609, and in 1615 elected Lumleian lecturer at the College of Physicians. In 1616 he brought out his views on the circulation of the blood, and two years later published "On the Movement of the Heart in Blooded Animals," which appeared at Amsterdam and made known his views relative to the circulation of the blood. In the preface he stated that he had established the theory by investigations covering nine years, and also answered objections made to them by the most skillful anatomists holding contrary views. In 1623 he became physician to James I. and in 1632 to Charles I. With the latter he was present at the battle of Edgehill, and in 1656 resigned as lecturer in the College of Physicians, a position he held for forty years. Oxford granted him a degree, and he was the recipient of many distinguished honors. His practice was almost ruined when his views were first announced.

HARZ MOUNTAINS, also called **Hartz** (härts), the most northerly mountain chain of Germany, extending between the Weser and Elbe, and trending from the northwest to the southeast. The range is about twenty miles wide and sixty long, rising quite abruptly from the plains in irregular ridges. It is covered in many places with native forests. The average elevation is about 1,500 feet. Brocken, the predominating peak, is elevated 3,741 feet above sea-level. The range is divided into two portions, the southeasterly being known as the Lower Harz, and the remainder as the Upper Harz, the latter being the higher and including Brocken. Many historic incidents are connected with these mountains, chiefly because they form a natural boundary between the High and Low German peoples. They have

entered largely into German literature, lending a realistic vividness to poetic imagination. The mineral deposits are exceedingly rich, including zinc, copper, silver, iron, arsenic, lead, marble, granite, slate, alabaster, and porphyry. There are valuable forests, fertile valleys, and fine pasture lands.

HASDRUBAL (hăz'drŭ-bal), more correctly Asdrubal, the name of several generals of Carthage, of whom the son-in-law of Hamilcar was the most distinguished. He operated with Hamilcar in Spain from 236 B. C. until the death of the latter in 228, when he became the commander in Spain. Within this period the Carthaginian possessions were advanced from the Guadalquivir to the Tagus, and the present city of Cartagena was founded as the capital. Not only did he possess the ability of a successful warrior, but encouraged agriculture, built palaces, constructed highways and canals, and brought about a general era of prosperity. His influence was rather that of an administrator than a warrior. He was so powerful in statesmanship that Rome treated with him in regard to boundary regulations rather than with the government of Carthage. In 220 he was assassinated by a Celtic slave. Another Hasdrubal of much eminence was the brother of Hannibal, hero of the Second Punic War. He commanded the army in Spain in 218 B. C., when Hannibal was operating in Italy, and conducted military operations against Publius Scipio. In 207 he led an army into Italy to assist Hannibal, but was defeated and slain on the banks of the Metaurus. His head was thrown into the camp of Hannibal, under the command of Nero, as an announcement to the former that his brother had fallen.

HASHISH, or **Hashes** (hăsh'ēsh), a term applied to the tops and tender sprouts of a variety of hemp native to India, and also to an intoxicating preparation made of this plant, which is smoked, drunk, and taken in confections. The habit of using hashish prevails extensively in the East, where it enters to some extent into the practice of medicine. The juice of the plant contains narcotic properties, and exudes from it in the form of resinous matter. Whether taken as a beverage, with confections, or smoked, it has a marked stimulating influence. When taken in excessive quantities, it has an intense intoxicating effect, which is accompanied by results quite similar to those affecting persons using alcoholic beverages excessively. The effects partake largely of the nature of hallucinations and merriment, but are frequently accompanied by boisterous, quarrelsome tendencies.

HASTINGS (hăst'ĭngz), a city in Nebraska, county seat of Adams county, situated in a fertile agricultural country, and noted as an important railroad junction. Among the public buildings are the city hall, Masonic temple, county courthouse, state asylum for the insane, a Roman Catholic academy, Hastings College, and several excellent public school buildings. There is a large trade in live-stock, cereals, and fruits. The city is supplied with waterworks, electric lights, street railways, a public library, and numerous societies and periodicals. There are manufactures of flour, canned and packed goods, pottery and brick, machinery, utensils, and cigars. The wholesale jobbing trade is very extensive. Population, 1900, 7,188.

HASTINGS, a seaport of England, on the Strait of Dover, in Sussex county, fifty-four miles southeast of London. It forms, together with St. Leonards, an important railroad and trade center. The principal industries are fishing and boat-building. During the greater part of the year it is frequented by large numbers of invalids, who bathe in its waters or take treatment for pulmonary complaints. The town is of great antiquity, possessing importance in the early times of the Anglo-Saxons. King Harold garrisoned it as a means of defense against William the Conqueror, but it surrendered to the latter without much resistance. He made it his permanent base of operations, and on Oct. 14, 1066, the celebrated battle of Hastings occurred between the two leaders at Senlac Hill, in which Harold was defeated and his army destroyed. The present population, including St. Leonards, is 60,380.

HASTINGS, Warren, first governor-general of British India, born in Churchill, England, Dec. 6, 1732; died Aug. 22, 1818. He was left an orphan at an early age, attended the Westminster school, and when seventeen entered the service of the East India Company as writer. From 1758 to 1761 he represented the company at Moorshedabad. In the latter year he was removed to Calcutta and three years later returned to England. In 1769 he re-entered the service of the company and was stationed at Madras, but in 1772 was made president of the council at Bengal. The regulating act passed by parliament in 1773 modified the power of the company and Hastings became governor-general, being associated in the government by a council of five. His policy was opposed by a majority of the council, which led to financial and internal difficulties, and he resigned in 1776. The following year he again accepted the office and displayed much administrative and reformatory ability. Complications arising with several native forces of the Deccan and Mysore, he displayed severity in procuring the necessary funds to conduct defensive movements, which gave rise to opposition in the house of commons and resulted in his resignation in 1784. Soon after he was called before parliament on charges of bribery and misappropriation of funds, but was acquitted after spending his fortune in the defense. The trial became celebrated on account of the active interest taken by such eloquent speakers as Fox, Burke, and Sheridan, who opposed him with

all their force of oratory, unmindful that Hastings had established English dominion in India, though, perhaps, making some mistakes. His acquittal was announced in 1795 and the East India Company settled an annuity of $20,000 on him the following year, and extended to him a loan of $250,000 without interest for a term of eighteen years. After this he lived in retirement at Daylesford.

HAT, a covering for the head, generally with a crown and brim, and of various materials, shapes, and styles. The manufacture of hats originated with the ancients, who employed different fibers for making outdoor covering for the head. Hats began to resemble those now worn at the time of Alexander the Great, when the Greeks made hats of round felt called petasos. Extensive manufactures of headwear began in western Europe in the latter part of the 15th century. In 1760 silk hats were made and came into style at Florence, but the manufacture did not assume its present aspect until 1828. The exhaustion of certain fur products and many changes of style in hats for both men and women has led to the use of various classes of material. At present they are made largely of cloth, felt, silk, splints, grass and straw, and serve either as a protection for the head, as an ornament, or for both purposes.

HAUPTMANN, Gerhart, dramatist, born in Salzbrunn, Germany, Nov. 15, 1862. He studied in Jena, Breslau, and Berlin, after which he traveled in Italy, but later settled in his native town. Few modern writers have attracted more general attention, many of his works being widely translated. "The Sunken Clock" is his greatest dramatic production. Other well known works include "Michael Kramer;" "Before Sunrise," and "Lonesome People."

HAUSSMANN (ōss-män'), **George Eugene**, statesman, born in Paris, France, March 27, 1809; died there Jan. 12, 1891. After studying music, he became a law student and was admitted to the bar. He was made prefect of the Seine under Louis Philippe. Subsequently he became prefect of Toulon under Napoleon III., later of Bordeaux, and in 1853 of Paris. His administration was marked by vast expenditures for general improvements, such as bridges, boulevards, sewerage, barracks, and public parks. The entire amount spent for improvements in Paris aggregated $175,000,000, and the burdens of taxation led to much dissatisfaction, causing his dismissal from office in 1870. The next year he became director of the Credit Mobilier, and was elected to the chamber of deputies in 1877. The term "Haussmannizing" is a popular expression when speaking of removing buildings for the purpose of constructing improvements. Haussmann edited "History of Paris," and was engaged in writing his "Memoirs" at the time of his death.

HAVANA (ha-văn'a), in Spanish, la Häbänä, the capital of Cuba, situated at the northwest side of the island, and on an extensive natural harbor. The entrance to the harbor is about 350 yards wide, and on each side are several forts, which occupy convenient heights above the place where vessels pass. The city was founded by the Spanish in 1515, under the direction of Diego Velasquez, but its growth dates from 1519, when it was replatted and improved by public buildings. Buccaneers burned it in 1528. It was taken by the English in 1762, at which time it was the center of trade in the West Indies, but it remained under Spanish dominion until 1898, when it was occupied by the United States and the revolutionists.

The old portion of the city has narrow streets, but the newer part contains many excellent buildings and is adorned by beau-

AVENUE IN HAVANA.

tiful avenues of palm trees. All the principal streets are improved by pavements, street railway lines, waterworks, and sewerage. Railroad and telephone connections are also extensive, and the streets are lighted by electricity. The public buildings include a cathedral built in 1724, an orphan asylum, public school buildings, miscellaneous colleges, and a university. As a sugar market it ranks as the most important in the world, and its manufacture of tobacco is likewise extensive. Other products include molasses, hats, woolen fabrics, clothing, wax, earthenware, machinery, and implements. The shipyards of Havana for many years produced the principal portion of the vessels for the Spanish fleet. At present the export and import trade is important, especially with the United States. Since the Spanish-

American war the city has made rapid improvements. Its public school system has been organized on the plan of the public schools in the United States, besides which are many religious and scientific societies, hospitals, and institutes. Several periodicals published there have a wide circulation. On Feb. 15, 1898, the United States battleship Maine was destroyed in the harbor of Havana while on a friendly visit, and 262 officers and men were lost. Population, 1899, 235,981.

HAVELOCK (hăv'ẹh-lŏk), **Sir Henry**, soldier, born in Durham, England, April 5, 1795; died Nov. 22, 1857. He was the son of a shipbuilder, who made provision for his education at the Charterhouse School, and in 1815 he entered the army. In 1823 he was sent to India, where he distinguished himself in the Burmese war in 1824-26. Later, in 1856, he was dispatched to Allahabad to support the forces at Lucknow against the Indian mutiny, and also to relieve those at Cawnpore. With a force of 2,000 men he reached Cawnpore, where he found that Nana Sahib had massacred the English prisoners. He proceeded at once in his march upon Lucknow, and defeated the enemy in eight successive battles, but retreated with his greatly diminished army to Cawnpore, where he was shut up until relieved on Nov. 17, 1857, by Sir Colin Campbell. Havelock served his country with heroic bravery. He died of dysentery at Dilkusha. The title of honor intended for him was conferred upon his eldest son, while a pension of $5,000 per year was given to his widow.

HAVERFORD COLLEGE (hăv'ẹr-fọrd), an institution of learning established by the Society of Friends at Philadelphia, Penn., in 1830. There is a faculty of twenty-five teachers. It has extensive courses of study and adequate buildings. The library includes 40,000 volumes.

HAVERHILL (hā'vẹr-ĭl), a city of Massachusetts, in Essex county, on the Merrimac River, thirty-two miles north of Boston. There are excellent connections by railroads and electric railway lines. It is noted for its extensive manufactories, which represent a capital of $10,500,000, employ 9,500 persons, and produce merchandise annually valued at $28,500,000. The principal products are fine hats, boots and shoes, leather, machinery, and agricultural implements. Haverhill is the birthplace of John G. Whittier. It contains a monument to commemorate the historic liberation of Hannah Dunston from her Indian captors in 1697. There are many fine school and church buildings, sewerage, public parks, pavements, and electric lighting. The city has a large trade in merchandise. Population, 1900, 37,175.

HAVERSTRAW (hăv'ẹr-strạ), a town of Rockland county, New York, on the Hudson River, thirty-five miles north of New York City. There are railroad and other conveniences. The town has manufactures of brick, paper, and copper products. Population, 1900, 5,935.

HAVRE (hä'vẹr), an important seaport in the department of Seine-Inférieure, France, on the estuary of the Seine, about 108 miles northwest of Paris. Besides numerous steamboat lines, it has connections by a network of railroads. It dates from 1516, when it was a small fishing village, but its harbor was improved and fortified by Francis I., after which it grew to importance. At present it ranks next to Marseilles as the most extensive commercial center of France. There are manufactures of paper, cotton and woolen goods, clothing, earthenware, chemicals, cordage, oil, glass, beet sugar, and machinery. Its export trade with the United States is extensive. It is also noted for its large emigration traffic, the most important of France. The city has beautifully improved streets, including electric lights and street railways, waterworks, public parks, and stone pavements. There are many fine schools and churches and several institutions of higher learning. Population, 119,967.

HAWAIIAN ISLANDS (hä-wī'yăn), or **Sandwich Islands**, an archipelago of twelve islands in the Pacific Ocean, of which the most important are Hawaii, Oahu, Maui, Molokai, Kauai, Niihau, Lanai, and Kahoolawe. The total area is 6,449 square miles, and, according to the census of 1900, there is a total population of 154,001. The island group was discovered in 1542 by Gaetano, a Spanish explorer, and in 1778 visited by Captain Cook. The government previous to the last century was vested in separate kings resident on the different islands, but in the early part of that century Kamehameha I. consolidated them into one monarchy, in which form they were governed by him and his successors until about 1886, when the people secured numerous concessions. In 1874 Kalakaua succeeded to the throne, and at his death, in 1891, he was succeeded by Queen Liliuokalani. The government of this queen did not meet with the approval of the large foreign element and the progressive party, and she was deposed in January, 1893, when a republic was organized. Sanford B. Dole was chosen provisional president, and was confirmed chief executive of the island on July 4, 1894, when the new government was officially declared. Annexation to the United States was advocated immediately after the republic was proclaimed, but official annexation did not take place until July 7, 1898. On Aug. 12 of the same year Annexation Day was celebrated at Honolulu with imposing ceremonies, and the islands were formally declared a possession of the United States in the presence of a great crowd.

The climate of the Hawaiian Islands is mild and temperate, the temperature seldom falling below 52° Fahr. and rarely rising above 90°. Most of the geological formations

are volcanic, though coral reefs abound. Much of the surface is exceedingly fertile. There are groups and chains of mountains in the larger islands, the most elevated peaks occurring in Hawaii, the largest island, where Mauna Kea rises to an elevation of 16,810 feet, and Mauna Loa to a height of 13,678 feet. Several of the volcanoes are still active. The more recent eruptions were those of 1880 and 1887, when lava flowed from Mauna Loa for a period of eight months, spreading in a stream from two to forty miles in width. The domestic animals are the same as those of the United States, including cattle, hogs, horses, mules, and sheep. There are extensive productions of rice, coffee, sweet potatoes, and a general variety of tropical fruits and vegetables. Vegetation of all kinds is luxuriant, the forests extensive, and the flora of surpassing beauty. Telephone, telegraph, and railroad lines have been built on all the larger islands. The manufactured products include canned fish, sugar, ice, earthenware, tobacco, utensils, clothing, and fabrics. Among the chief minerals are basalt, sandstone, and coral rock, but no metals abound. Birds of song and plumage are abundant. There are few other animals; those most abundant include wild swine, rats, dogs, and a species of bat that flies by day.

Schools have been established under the United States government in all settled portions, being supported by grants and taxation, and all classes show willingness to profit by public instruction. The government is vested in a local senate and house of representatives, and an executive appointed by the president of the United States. President McKinley appointed Sanford B. Dole governor, who was the first to hold that position and took the oath of office on June 14, 1900. The constitution of the United States extends over Hawaii, being the fundamental law of the colony. Honolulu is the capital and largest city. It is an important commercial center and seaport. Other growing cities include Hilo, Hawaii; Wailuku, Maui; Lihue, and Kauai. The island group is of importance for the reason that it occupies a central position in the Pacific, and also for its superior natural resources. The annual exports aggregate a value of $20,850,500, and the imports, $14,372,680.

HAWK.

HAWK, the name of several species of birds, and frequently applied to all birds of prey except the vultures, owls, and eagles. The falcons are included with the hawks proper, though the latter differ from them in that their beaks are smaller and wings shorter. The goshawk and sparrow hawk are widely distributed in the continents and islands. They are noted for their rapacious and fierce habits, and the swiftness with which they pursue animals and birds for the purpose of catching them. The American hawk preys upon insects, small quadrupeds, and domestic chickens. It is a common bird in many parts of the United States. The color of most species of hawks is grayish-brown. See **Falcon**.

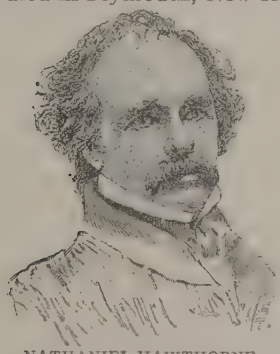
HAWKINS (hawk'ĭnz), **Sir John**, sailor, born in Plymouth, England, about 1520, died in Porto Rico, West Indies, Nov. 21; 1595. He became a seaman at an early age, sailing to Spain and Portugal. He was the first English slave trader, which he became in 1562. After making several voyages in the interest of the slave traffic, he engaged in the business, sailing with a squadron to the coast of Guinea in 1562. In 1573 he was made treasurer of the British navy, and was knighted in 1588 on account of valuable service against the Armada of Spain. Though an efficient seaman, he was rude and avaricious.

HAWLEY (haw'lĭ), **Joseph Roswell**, statesman, born in Stewartsville, North Carolina, Oct. 31, 1826. He removed with his parents to Connecticut, graduated from Hamilton College, New York, in 1847, and three years later was admitted to the Connecticut bar. In 1857 he became editor of the "Evening Press" at Hartford, and at the beginning of the Civil War enlisted as a lieutenant in the Union army. For efficient services at Bull Run he was raised to lieutenant-colonel. Subsequently he took part in the battles of Port Royal, Fort Pulaski, James Island, and Pocotaligo, becoming brevet major-general, and was mustered out in 1866. He was elected governor of Connecticut in the same year. In 1872 he was elected to congress as a republican, and was twice re-elected. Shortly after he was chosen a United States senator, being re-elected in 1887, 1893, and 1899. He served as president of the United States centennial commission in 1876, giving valuable aid to the exposition in Philadelphia.

HAWTHORNE, Julian, author, son of Nathaniel Hawthorne, born in Boston, Mass., June 22, 1846. He was educated at Harvard University. Later he studied engineering in Dresden, Germany, but discontinued his work there on account of the Franco-German War, and became connected with General McClelland's staff of engineers on the New York docks. His first contributions to American magazines were made in 1872, and shortly after he returned to Germany, where he drew inspiration for much

of his work in literature. He visited Europe again in 1889 in connection with a delegation of workingmen for the purpose of studying the industries of Europe. Hawthorne produced many valuable magazine articles and other writings, mostly novels. Among his best known productions are "Saxon Studies;" "A Fool of Nature;" "Trial of Gideon;" "Confessions of a Convict;" "American Literature;" "Professor's Sister;" "Another's Crime," and "Confessions and Criticisms." His "A Fool of Nature" secured the prize of $10,000 offered by the "New York Herald" in 1896.

HAWTHORNE, Nathaniel, eminent author, born in Salem, Mass., July 4, 1804; died in Plymouth, New Hampshire, May 18, 1864. His grandfather, Daniel Hawthorne, was a naval officer during the Revolutionary War, and his father, Nathaniel Hawthorne, was also a seaman, and died when young Nathaniel had reached the age of four years. He graduated with the poet Longfellow from Bowdoin College in 1825, and was an intimate friend of Franklin Pierce. After leaving college, he adopted hermit-like habits that clung to him ever after. In 1828 he published "Fanshawe," his first novel, which attracted some attention, though he never acknowledged its authorship. "Twice Told Tales" appeared in 1837. It attracted much attention, and was praised by Longfellow in the "North American Review." The following year he received an appointment as weigher in the Boston custom-house, and in 1842 married Susan Peabody, of Salem, Mass. President Pierce appointed him consul to Liverpool, which position he filled from 1853 to 1857. Hawthorne is noted for high moral power combined with an artistic finish and exquisite literary style. Many of his later writings were finished in Europe, where he spent seven years, and returned to America in 1860. Among his productions not mentioned above are "The Scarlet Letter;" "Mosses from an Old Manse;" "House of Seven Gables;" "Marble Faun;" "Wonder Book;" "Snow Image;" "Tanglewood Tales;" "Blithedale Romance;" "Life of President Pierce;" "Our Old Home," and "Transformation." Hawthorne was buried in Sleepy Hollow cemetery, Concord, where also are the graves of Thoreau and Emerson.



NATHANIEL HAWTHORNE.

HAY, the stems of grasses and other plants cut and dried for fodder. The total area devoted to the culture of hay in the United States is estimated at 42,500,000 acres, which yields an annual product of 65,500,000 tons, the crop being valued at $450,500,000. Among the states producing the largest crops of hay are Iowa, New York, Kansas, Pennsylvania, Missouri, Illinois, and Nebraska, but the annual output varies largely on account of the difference in the amount of rainfall, it being quite necessary that the early part of the growing season be favored with an abundance of moisture. The best quality from the different plants is secured when the saccharine matter is most abundant, which occurs when they are in full bloom. The grasses are harvested by mowing machines, which cut swaths four to six feet wide. On large farms the hay is allowed to cure a short time and is then tedded mechanically and loaded on wagons by means of machinery, to be stored in stacks or hay-mows. In many of the larger western hay-fields it is customary to push the hay by means of hay-sweeps to the stacks, where it is lifted by horse-power under roofing. To obtain a nutritive quality of hay it is necessary that the weather be dry, since grasses are more or less damaged by moisture in the process of curing, and thereby lose much of their flavor and nutritive qualities. Timothy, clover, alfalfa, red top, and native grasses are the chief plants utilized to make hay.

HAY, John, author and diplomat, born in Salem, Indiana, Oct. 8, 1838. When twenty years of age, he graduated from Brown University, was admitted to the Illinois bar in 1861, and was made assistant secretary to President Lincoln. Later he also became his adjutant and aide-de-camp, and attained to the rank of colonel by serving in the field under Generals Hunter and Gillmore. From 1865 to 1868 he served as secretary of legation at Paris and Vienna. In 1870-75 he was on the editorial staff of the "New York Tribune," and in 1879 became assistant secretary of state under President Hayes, but two years later resumed work on the "New York Tribune." President McKinley appointed him ambassador to England in 1897, and in 1898 he was made secretary of state to succeed William R. Day. Among his well known writings are "Life of Abraham Lincoln;" "Pike County Ballads;" "Castilian Days," and a translation of Castelar's "Republican Movement in Europe."

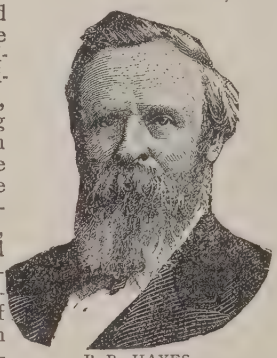
HAYDN (hā'dn), **Joseph,** celebrated German composer, born in Rohrau, on the border of Austria-Hungary, April 1, 1732; died May 31, 1809. His father was a wheelwright, and, owing to the remarkable musical talent of his son, gave him all possible encouragement. When but eight years old, he was appointed a member of the choir at St. Stephen's Church, Vienna, but an impairment of his voice caused him to lose his place as chorister at the age of sixteen. He next earned a small competence, sufficient to

rent a piano. This enabled him to continue his studies, and at the same time to give private lessons to a large class of pupils. Herr Kurz, a theatrical manager, was attracted by his musical talent and employed him to write an opera. In 1761 he became musical director to Prince Esterhazy, a position he held till 1790, during which time he composed twelve operas and 120 symphonies for the orchestra, besides many other productions of value. In 1790 he visited various European cities, including Berlin, Paris, and London, and two years later returned to Vienna much benefited financially. His productions were prepared with much care and quite slowly, but, being an incessant worker, his compositions are exceedingly numerous. The symphony and the stringed quartette were originated by him. Among the most excellent of his many works are "Orpheus and Eurydice;" "Creation;" "Seasons;" "Haydn's Farewell;" "Paradise Lost," and "Seven Words of Our Saviour on the Cross."

JOSEPH HAYDN.

HAYES, Isaac Israel, Arctic explorer, born in Chester county, Penn., March 5, 1832; died in New York City, Dec. 17, 1881. In 1853 he graduated from the medical department of the University of Pennsylvania, and the same year sailed as surgeon of the second Grinell expedition in search of Sir John Franklin. From 1862 to 1865 he was surgeon of volunteers in the Civil War, obtaining the rank of brevet lieutenant-colonel by valued services. He made a voyage to the Arctic region in 1869, and succeeded in making a number of valuable discoveries, thus supplementing those made on his second voyage in 1860. He published "Open Polar Sea;" "An Arctic Boat Journey;" "Cast Away in the Cold," and "Land of Desolation."

HAYES, Rutherford Burchard, nineteenth president of the United States, born in Delaware, Ohio, Oct. 4, 1822; died in Fremont, Ohio, Jan. 17, 1893. The death of his father in 1822 left his mother in modest circumstances, but he secured a good elementary education in the common schools. Later he studied at an academy in Norwalk, graduated from Kenyon College in 1842, and at Harvard College Law School in 1845. Soon after he began to practice law at Lower Sandusky, but removed to Cincinnati to practice his profession in 1850; served as city solicitor in 1859-61, and entered the Civil War as major. He distinguished himself in the campaigns of West Virginia and at Winchester, was severely wounded at South Mountain, and rose to the rank of brevet major-general. In 1864-66 he served as member of congress, was governor of Ohio from 1867 to 1871, and was elected a third time in 1875. The republicans nominated him for president in 1876, and, after an exciting campaign, both parties claimed the election. To settle the prolonged dispute that arose, congress appointed an electoral commission, which decided by a vote of eight to seven in favor of the republican electors, the vote being strictly on party lines; it gave Hayes a majority of one in the electoral college. The democratic nominee, Samuel J. Tilden, received 4,284,885 of the popular votes, and Hayes 4,033,950. Many of the adherents of Tilden claimed his election, from which the terms president de facto and president de jure arose, the former meaning actual as distinguished from rightful, and the latter meaning by right. Among the events of the administration of President Hayes are the withdrawal of United States troops from North Carolina and Louisiana, civil service reform, and financial legislation designed to strengthen the public credit and to relieve the country from the panic of 1873. At the expiration of his term he returned to his home in Fremont, Ohio, and withdrew from public service. He was the recipient of various distinctions, among them degrees conferred by Kenyon College, Harvard University, Yale College, and Johns Hopkins University. He was honored by positions in many scientific, charitable, and educational societies, and in each of them rendered distinguished services.



R. B. HAYES.

HAYNE (hān), **Robert Young**, statesman, born in St. Paul's parish, South Carolina, Nov. 10, 1791; died Sept. 24, 1839. He was admitted to the bar at the age of twenty-one, served with distinction in the War of 1812, and practiced law at Charleston. From 1814 to 1818 he served as a member of the legislature, was attorney-general of the state in 1818-22, United States senator in 1823-32, and was elected governor in the latter year. Both in the national and state legislative bodies he was a strong advocate of state rights, which in the former led to the famous debate between himself and Webster. In 1832 he was chairman of the state convention in South Carolina that reported the nullification ordinance. As a speaker he ranked among the most brilliant of his time.

HAYTI (hā'tĭ), or **Haiti**, a republic occupying the western part of the island of Hayti, the eastern part being the republic

of San Domingo. The island of Hayti is, next to Cuba, the largest of the West Indies. It is separated from Cuba by the Windward Passage and from Porto Rico by Mona Passage. Its length from east to west is 400 miles; width, 155 miles, and area, 28,250 square miles. Much of the surface is mountainous, but there are extensive valleys, savannahs, and coast plains. The highest mountain chain trends through the central part, Loma Tina being the culminating peak; height, 10,165 feet. The climate, like that of other West Indian islands, is variable, the seasons being designated as wet in May and June, and dry during the time of lower temperature, but it ranks as the most healthful of the entire group. There are numerous small streams that drain the interior; the coast lines are irregular, and extensive forests abound.

Hayti was discovered by Columbus in 1492, when about 2,000,000 natives inhabited the island, but under Spanish rule they were reduced to slavery and many perished. The French settled in the western part in 1630, and secured a cession of that portion from Spain in 1697. Under the leadership of Toussaint l'Ouverture, the Negroes led a revolt against France in 1791, and an independent republic was established, but this was suppressed, and he was made a prisoner. Another revolt was led by Dessalines in 1803, when he was made emperor, but was assassinated three years later, and Spain again gained possession of the entire island. After many years of war and bloodshed the two portions became separated and now exist as independent republics.

The republic of Hayti has an area of 10,204 square miles and a population of about 1,250,000. The inhabitants are Negroes and mulattoes, about ninety per cent. being of the former class. Port-au-Prince is the capital and largest city. Other important cities include Cape Haytien, Les Cayes, and Mirebalais. The official language is French, and the prevailing religion Roman Catholic. Public schools of an elementary nature are maintained in most of the districts, but are in a backward condition. The government is vested in an assembly and a president, whose term is seven years. Among the industries are agriculture, lumbering, commerce, mining, and manufacturing. The soil being productive, agriculture is the principal industry, and the products rum, coffee, tobacco, cotton, sugar cane, cacao, and many varieties of tropical fruits. Among the minerals are gold, silver, and quicksilver. The forests yield logwood, pine, satinwood, mahogany, and dyewoods. Among the domestic animals are cattle, swine, mules and horses. The export and import trade is largely with the United States, Germany, France, and Great Britain. There are productive fisheries, yielding both pearls and fin fish. The manufactures are unimportant, including largely cigars, utensils, fabrics, toys, and machinery. General Hippolyte was succeeded in the presidency in 1896 by Gen. T. Simon Sam. See **San Domingo.**

HAZEL, a class of shrubs or small trees belonging to the genus corylus, widely distributed in North America, Eurasia, and Africa. There are twelve recognized spe-

HAZEL. 1, FLOWER. 2, FRUIT.

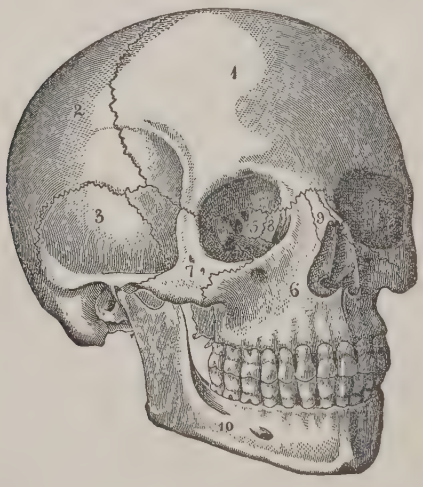
cies. They bear nuts much favored as food and for the production of hazel-nut oil. The larger nuts borne by the hazel tree are called filberts and the smaller hazel nuts. They have staminate and pistillate flowers, and are among the first plants to bloom in the spring. The wood of many varieties is used for making baskets, hoops, crates, and for charcoal, and the roots are serviceable in veneering. The charcoal of the hazel tree is valuable for painting and in the manufacture of gunpowder. A variety common to Italy yields woods useful in refining turbid wine.

HAZEN, William Babcock, soldier, born in West Hartford, Vermont, Sept. 27, 1830; died in Washington, D. C., Jan. 16, 1887. After graduating from West Point in 1855, he served against the Indians in California, Oregon, and Texas. He became assistant professor of tactics at West Point in 1861. However, he enlisted in the Civil War, serving in the battles of Shiloh, Corinth, Stone River, and Chattanooga, and accompanied Sherman on the march to the sea. In 1864 he captured Fort McAllister, for which service he was made major-general. He became chief signal officer in 1880, with the rank of brigadier-general. He published "Narratives of Military Service" and "School and the Army in Germany and France."

HAZLETON (hā'zl-tǫn), a city of Pennsylvania, in Luzerne county, eighty miles northwest of Philadelphia. The surround-

ing region is noted for its immense production of anthracite coal. It is conveniently connected by railroads, has a good common school system, many churches, and is the seat of a Catholic convent and academy. Among the manufactures are ironware, machinery, coffins, brushes, and earthenware. Street railways, telephones, waterworks, and pavements are among the improvements. Population, 1900, 14,230.

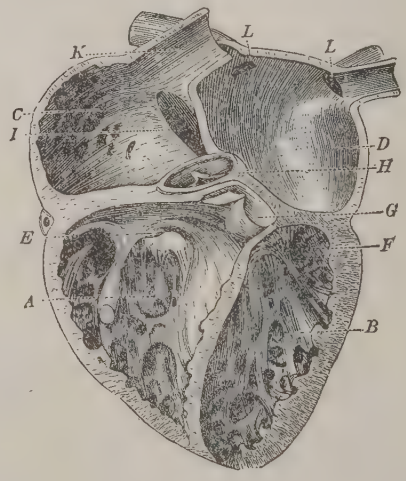
HEAD, that part of the body of an animal which contains the brain and the organs of the special senses. The head of man has twenty-two bones, which form a cavity for



HEAD.
1, frontal bone; 2, parietal; 3, temporal; 4, sphenoid; 5, ethmoid; 6, superior maxillary; 7, malar; 8, lachrymal; 9, nasal; 10, inferior maxillary.

the protection of the brain and the organs of smell, hearing, sight, and taste. These are immovable, except the lower jaw, which is hinged at the back so as to allow the mouth to be opened and shut. The skull bones are composed of two compact plates, with a spongy layer between. These bones are joined at the outer portions by sutures in a way termed dove-tailing by carpenters. Within the skull is the delicate brain, peculiarly protected by the oval shape of the bones. The smaller and stronger structure of the skull is toward the front, where danger is greatest, while the spongy packing between the layers serves to deaden a blow that might fall upon the head. Nerves penetrate through the openings of the skull and communicate with the brain. The skull proper consists of eight bones—two temporal, two parietal, and a frontal, occipital, ethmoid, and sphenoid. There are fourteen bones in the face, including the vomer and the inferior maxilla; and two each of superior maxillæ, nasal, malar, lachrymal, turbinated, and palate. Many animals of the lower forms of life are destitute of heads.

HEART, the organ that propels the blood and causes it to circulate through the arteries, veins, and capillaries. It is muscular, pear-shaped, and about the size of the fist. There are four chambers, the two upper being called auricles and the two lower ventricles. The auricles are receiving chambers, and the ventricles expelling chambers, but the auricles and ventricles on each side communicate with each other, while the right and left halves of the heart are distinct and perform different offices. The red blood is propelled by the left side, and the dark blood by the right. In man the heart hangs point downward in the left central part of the chest, is enclosed by a loose sack of serous membrane, called the pericardium, and is held in place by the attachment of the pericardium to the diaphragm, and by the large blood vessels that communicate with it. The heart has an alternate contraction and expansion movement; the former is called the systole, and the latter diastole. Blood flows into the heart during the diastole movement, and is expelled by the systole. The beating of the heart is due to these movements, and may be distinctly heard between the fifth and sixth ribs. The impure blood coming from the system enters the right auricle through the inferior and superior vena cava, thence passes into the right ventricle through the tri-cuspid valve, and is then driven past the semi-lunar valves through the pulmonary artery to the lungs to be purified. It next returns as bright-red



HEART.
A, right ventricle; *B*, left ventricle; *C*, right auricle; *D*, left auricle; *E*, tricuspid valve; *F*, bicuspid valve; *G*, semi-lunar valves; *H*, valve of the aorta; *I*, inferior vena cava; *K*, superior vena cava; *L*, pulmonary veins.

blood through the four pulmonary veins to the left auricle, is forced past the bicuspid valve to the left ventricle, and is driven through the semi-lunar valves into the

great aorta, whence it passes into the general circulation.

HEAT, a physical agent or form of energy generated by the transformation of some other form of energy, as by chemical action, combustion, or the stoppage of mass-motion by friction. Heat possesses the power of vaporizing, expanding, melting, and decomposing bodies; of raising their temperature, and of passing through space with the velocity of light. It may be manifested as light, as temperature, as chemism, or in all of these ways at the same time. The theory of heat now generally accepted is that of Macedonio Melloni (1801-54), an Italian physicist. This theory is called the theory of undulation, and supposes that heat is caused by a vibratory or oscillatory motion of the particles of the body and is a condition of matter, not a substance. The hottest bodies are those in which the vibrations move quickest through the widest space. The theory implies that the molecules of solid bodies are in constant vibration. When this oscillation is increased, the body becomes heated; when it is decreased, the body is cooled. Ether fills the vacant spaces between the molecules. The ether puts the molecules in motion, or it is thrown into vibration by them, in the same manner as the air moving through the leaves of a tree sets its boughs in motion, and in turn may be kept in motion by the waving of branches. The sources of heat are chemical and mechanical energy, the stars, and the sun.

That friction and percussion produce motion may be illustrated in bringing a moving mass in contact with one at rest, by which the motion of the mass is changed into motion among molecules. Chemical action is seen in fire, in which the oxygen of the air has an affinity for the carbon and hydrogen of the fuel, and, by combining the chemical energy, there is a transformation into that of sensible heat. The cause of heat coming from the sun and stars is the rapid vibration of the molecules. By them waves of ether are set in motion, which are propagated across the intervening space, and give up their motion when they meet the earth. The effect of heat upon all solid, liquid, or gaseous bodies is to expand them, while cold contracts. The only partial exception to the rule is water (q. v.). At a certain temperature heat vaporizes liquids, and in solids produces fusion. By conduction and radiation it may be transmitted to other bodies. The term radiated heat implies the heat produced by radiation, which gives rise to the terms thermal ray, ray of heat, and calorific ray, these being used in correspondence to the terms luminous ray and ray of light.

In propagating radiate heat from a hotter to a colder body the intervening medium is not heated. Both heat and light are transmitted by the same medium, and are similar in that they are the vibrations of an elastic medium, obey the same laws of reflection, interference, refraction, and polarization, and are subject to the general laws of wave-motion. Two bodies placed in contact with each other give off heat to each other. If they are equally hot, the exchange of heat is mutual, and it appears as if no heat passes between them, and they are then said to be of the same temperature. However, if one of them is more highly heated than the other, it gives more heat than it receives, and is therefore at a different temperature. Instruments used to measure temperature are called thermometers. Different scales or units of measurement may be adopted for measuring heat, and different chemicals serve in the preparation of thermometers. The branch of science that treats of the measurement of quantities of heat is called calorimetry.

HEAVEN, in science, the expanse which surrounds the earth and seems like a great dome or arch containing the sun, moon, and stars. It appears to rest on the horizon, and is in reality merely the aspect that a spectator sees when looking into the immeasurable space of the universe. In theology the word signifies the abode of God, where the Most High and the angels dwell and are especially manifest. Among the Jews heaven is regarded as the special abode of God, and it is held to be high above the earth. Christians believe that Christ came from heaven, and, after fulfilling His mission on earth, returned there to prepare a place for the saved. Those who reach heaven shall not experience hunger or thirst, nor feel undue heat nor any sorrow; a condition to be reached after the resurrection, when mortality shall become immortal and incorruptible.

HEBE (hē′bē), in mythology, the most attractive and joyous personification of eternal youth. She was the daughter of Zeus and Hera; a maiden with sparkling eyes, beautiful form, and modest in appearance. She was cup-bearer to the gods, but on account of an accident was deprived of her office and succeeded by Ganymede. Later she became the bride of Hercules, and was received among the immortals.

HEBEL (hā′bel), **Johann Peter**, German poet, born in Basel, Switzerland, May 11, 1760; died Sept. 22, 1826. He was educated at Carlsruhe and Erlangen, where he gave early evidences of much ability. In 1791 he was appointed professor of theology and Hebrew at Carlsruhe. He published "Allemanian Poems;" "Bible Stories," and edited the "Rhineland House Friend." His complete works were published in eight volumes in 1832-34.

HEBER (hē′ber), **Reginald**, poet, born in Malpas, England, April 21, 1783; died in Trichinopoli, India, April 3, 1826. He was educated at Oxford, became a clergyman, and spent many years in India, where he was second bishop of Calcutta. His writings

hold a high place in English literature. He is the author of "Palestine" and many other well known hymns. Among his hymns are the familiar "From Greenland's Icy Mountains;" "Lord of Mercy and of Might," and "Lo, He Comes in Clouds Descending."

HEBREWS. See **Jews.**

HEBRIDES (hĕb'rĭ-dēz), or **Western Islands,** a chain of islands off the west coast of Scotland. The total number includes about 500 islands and islets, of which only ninety are inhabited. They were colonized by the Norwegians in the 9th century, remaining subject to Norway till 1266, when they were attached to Scotland. The climate is humid and the soil largely poor. Agriculture, cattle rearing, and fishing are the principal industries. The entire group has an area of 2,780 square miles and a population of 81,500.

HEBRON (hē'brŏn), an ancient city of Palestine, located in the valley of Eschol, twenty miles south of Jerusalem. It is situated in the region anciently belonging to the tribe of Judah. The streets are narrow, and in it are tombs alleged to be those of Abraham, Isaac, Jacob, and others of the patriarchs. The surrounding country is noted for its fruits, especially grapes and olives. Abraham and David resided in Hebron a number of years.

HECLA (hĕk'la), or **Hekla,** an Icelandic volcano, situated twenty miles from the southwestern coast, elevated 5,100 feet above sea-level. It is covered with snow perpetually, contains several craters, and is composed largely of lava and basalt. The most extensive eruption on record occurred in 1783, when a stream of lava was thrown out which extended a distance of forty-five miles and was fifteen miles wide. Other notable eruptions were those of 1845 and 1878. The discharges consist largely of ashes, lava, and masses of pumice stone.

HECTOR, the defender of the city of Troy and bravest of the Trojan warriors. He was the son of King Priam and his second wife Hecuba, and husband of Andromache. The "Iliad" of Homer gives an account of his success over Patroclus, the friend of Achilles, and of the revenge sought by the latter. These two warriors met before the walls of Troy in mortal combat, which resulted in the death of the valiant Hector. In the "Iliad" is an attractive account of Hector, which describes the combat between him and Achilles, and details the incident of dragging his body at the chariot wheels of the conqueror. It also gives an account of its deliverance to Priam for ransom, and the solemn and impressive burial. The parting from Andromache before his last combat is an episode of especial beauty.

HECUBA (hĕc'u-bä), the second wife of Priam, king of Troy. She was the daughter of the king of Thrace, and became the mother of the valiant Hector, of the Prophetess Cassandra, and of Paris, the cause of the Trojan War. Her husband, Priam, and all but one of her sons were killed in the war with the Greeks. When Troy fell, she was made the slave of Odysseus, and because of cruelties became despondent and leaped into the Hellespont. The tragedy of Euripides, "Hecuba," is founded on this story.

HEDGEHOG, a mammal native to Eurasia and Africa, belonging to the insectivorous animals, and remarkable for its covering of spines instead of hair. It has

HEDGEHOG.

small black eyes and short legs. The body is about ten inches long. It defends itself against its enemies by contracting special muscles whereby it is rolled into a ball. The hedgehog inhabits small thickets and feeds on insects, worms, snails, and sometimes on vegetable matter, which it seeks at night. During the winter it hibernates. From three to eight young are born in a litter. The prickles develop soon after birth. There are fourteen species, most of which have only a rudimentary tail, and none are native to America or Australia. A closely related spine-bearing mammal, called Canada porcupine, is native to the United States.

HEGEL (hā'gĕl), **Georg Wilhelm Friedrich,** philosopher, born in Stuttgart, Germany, Aug. 27, 1770; died in Berlin, Nov. 14, 1831. He was educated at the University of Tübingen, became a family tutor at Berne and Frankfort, and in 1801 settled at Jena, where he formed an intimate friendship with Schelling. Until 1808 he was connected with a newspaper at Bamberg, but in that year he became rector of the Nurnberg Gymnasium. In 1813 he was elected to a professorship at Heidelberg, and two years later at Berlin, where he remained until his death. In thought and argument, Hegel was methodical and painstaking, acute in reasoning and precise in analyzing. He did not publish any writings until 1801, when an essay on the philosophy of Fichte and Schelling appeared. Soon after he settled at Jena, where he gave expression to many of his views in the "Critical Journal of Philosophy," a periodical published jointly by him and Schelling. The celebrated work, "Phænomenology of the Spirit," was published in 1807, by which he attained a marked reputation among the scholars of his time.

His greatest work, "Culture of Logic," appeared in 1812, and in 1816 followed his "Encyclopædia of Philosophical Culture." While at Berlin he wrote a large number of philosophical works, and gave to the world many valuable treatises on the so-called ideal school, of which he and Kant, Fichte, and Schelling were the promoters. His writings not mentioned above that are particularly noteworthy include "Philosophy of Right;" "Philosophy of Art;" "Philosophy of Religion;" "Philosophy of History," and "History of Philosophy." However, a number of these appeared as lectures before their publication in book form. Hegel was a successful teacher, inspired the confidence of his pupils, and maintained discipline without interfering with their sports and associations. His "Encyclopædia of Philosophical Culture" presents a complete outline of the Hegelian system as a whole.

HEGIRA, **Hejra**, or **Hijra**, an Arabian word meaning going away, and used to describe the flight of Mohammed from Mecca, Sept. 13, 622 A. D. This is the beginning of the Moslem era. A calendar made by Caliph Omar in 639 begins with the first day of the month in which the flight occurred.

HEIDELBERG (hī'dĕl-bĕrg), a city of Germany, in the grand duchy of Baden, on the Neckar River, ten miles southeast of Mannheim. It occupies a beautiful site in a valley between the river and the slope of the Königstuhl, an elevation 1,860 feet high, and has several beautiful streets. Its important buildings include a castle of much beauty begun in the 13th century, the church of the Holy Ghost, church of St. Peter's, and several public buildings. The university for which the city has long been celebrated was founded by Rupert I. in 1386, and carries courses in medicine, law, philosophy, and theology. It has 115 professors, about 1,250 students, and contains a library of 600,000 volumes. Among the manufactures of Heidelberg are musical and scientific instruments, fabrics, clothing, and machinery. The celebrated Heidelberg tun is kept under the castle. It has a diameter of twenty-six feet, a length of thirty-six feet, and a capacity of 50,000 gallons of wine. There are many beautiful parks, electric lights and street railways, pavements, and extensive railroad connections. Population, 36,834.

HEINE (hī'nĕh), **Heinrich**, author and poet, born of Jewish parents in Düsseldorf, Germany, Dec. 13, 1799; died Feb. 17, 1856. He first took a course in banking at Frankfort, but in 1819 entered the University of Bonn, and subsequently studied at Berlin and Göttingen, receiving a degree at the latter in 1825. About the same time he joined the Lutheran Church, and went upon a visit to the Harz Mountains, Italy, and other European countries for the purpose of studying natural scenery and customs. About this time he published his "Pictures of Travel," based on his observations, which met with extraordinary success. In 1827 appeared his "Book of Songs," many of which are masterpieces of German literature and are exquisite in beauty and thought. The revolution of 1830 imbued Heine with a spirit of democracy, and induced him to write on that subject, but this necessitated his leaving Germany, causing him to settle in Paris, where he supported himself by literary work until his death. He married in 1835; his wife, Mathilde, is mentioned frequently in his writings. In 1837 he was granted a pension by the French government, but it was discontinued in 1848 with the overthrow of Louis Philippe. He devoted much of his time to writings of a political nature, largely because of his personal interest in political affairs. He endeavored to produce a line of works that would acquaint the French with German art and literature, and, if possible, bring about a better feeling between the two peoples. In 1844 he visited his native country to see his mother, and, while there, published "Winter's Tales." The writings of Heine show a warm sympathy for men and are characterized by a vein of humor which often verges on burlesque. Among his writings not named above are "New Songs;" "The Newer Literature of Germany;" "Doctor Faust;" "Youthful Sorrows;" "Conditions in France;" "The Salon;" "Romanzero;" "Last Poems and Thoughts," and "Poems and Ballads." He also contributed to many periodicals, and was editor of "General Political Annals," which was published at Munich.

HEINTZELMAN (hīnt'sĕl-măn), **Samuel Peter**, soldier, born in Manheim, Penn., Sept. 30, 1805; died in Washington, D. C., May 1, 1880. In 1826 he graduated from West Point, served as lieutenant against the Indians, and was brevetted major at the beginning of the Mexican War, during which he rendered services in California and on the Rio Grande. In 1861 he was brevetted lieutenant-colonel for meritorious service against the Indians in California. Subsequently he commanded in the battles of Bull Run, Williamsburg, Fair Oaks, and the siege of Richmond. After the war he served in New York and Texas, and was placed on the retired list in 1869 with the rank of major-general.

HELENA (hĕl'ẹ-nạ), county seat of Philips county, Arkansas, on the Mississippi River, about eighty miles below Memphis, Tenn. It has good railroad and steamboat facilities. The surrounding country is agricultural. It has good schools, electric lights, waterworks, and is the seat of Southland College. Among its manufactures are shingles, cottonseed oil, machinery, lumber, and utensils. Population, 1900, 5,550.

HELENA, the capital of Montana, county seat of Lewis and Clarke county, in the

Prickly Pear valley, about fourteen miles west of the Missouri River. It is one of the most important railroad and jobbing centers of the state, has beautiful streets, electric and gas lights, electric street railways, and a fine system of waterworks. Besides a well graded public school system, it contains several private and parochial schools and the Montana University. There are also other public institutions, scientific societies, and a large number of excellent churches. It has a fine state capitol and numerous state and county buildings. The surrounding country is agricultural, and contains valuable deposits of gold, silver, ruby, and sapphire. Among the manufactures are harness, vehicles, flour, machinery, implements, lumber, and quartz products. Population, 1900, 10,770.

HELEN OF TROY, the daughter of Zeus and Leda, and wife of Menelaus. Greek legends describe her as a woman of great beauty. It is recounted that she was carried off by Theseus and Pirithous at the age of ten years, and that she was recovered by her two brothers, Castor and Pollux. Her thirty suitors included Menelaus, whom she chose as her husband, but Paris, son of Priam, king of Troy, carried her off, an incident which gave rise to the Trojan War. There are numerous stories concerning the fate of Helen, but it is most common to recount of her marriage to Deiphobus, brother of Paris, after the death of the latter. Later Deiphobus was betrayed by her to Menelaus, after which she returned with her husband to Sparta, and subsequent to his death was banished. Among the writers who have taken Helen for a subject are Homer, Virgil, Pausanius, Euripides, and Goethe. Grecian artists represented her in sculpture as the prototype of female beauty.

HELGOLAND (hĕl′gō-länd), an island in the North Sea belonging to Germany, situated thirty-eight miles from the mouth of the Elbe. Its coast lines rise perpendicularly from the sea, but the soil is very fertile. It is cultivated largely in orchards and gardens, but portions are utilized in sheep culture. The fisheries are important, especially those yielding haddock and lobsters, and as a summer resort it is a favorite gathering place. The island has a length of about two miles, a width of one mile, and contains a population of 2,010. In 1807 England forced Denmark to evacuate the island and in 1890 it was formally ceded to Germany.

HELICON (hĕl′ĭ-kŏn), now called **Sagara**, a mountain range in the southwestern part of Bœotia, Greece, and the fabled resort of the ancient Grecian muses. In these mountains were temples dedicated to the Muses and Apollo. It also contained the fountains of Aganippe and Hippocrene, which gave inspiration to the poet Hesiod. Paleo-Vuno, the loftiest peak, is 5,730 feet high.

HELIOPOLIS (hē-lĭ-ŏp′ō-lĭs), meaning city of the sun, the city called On, Beth-shemesh, or Rameses in ancient Egyptian writings, but now known as Matarich. It is situated on the Pelusiac branch of the Nile, near the canal which connects that river with the Red Sea, eight miles northeast of the present city of Cairo. Under the Pharaohs it was the most populous city of Egypt, being beautified by lakes and canals that connected it with the Nile, and in it were excellent temples and schools; the latter were visited by both Eudoxus and Plato. It is thought to have been the place where Joseph and Mary found refuge in their exile with the infant Christ. The pillar of On still stands near the present village. The obelisk now in Central Park, New York, was first brought to Alexandria from Heliopolis, and thence to America.

HELIOTROPE (hē′lĭ-ō-trōp), a genus of plants, including both annual and perennial species. They occur mostly in the warmer climates as herbs or undershrubs, but many are now cultivated extensively in all countries as ornamental plants and for the manufacture of perfumes. The leaves are oblong and small, flowers white or pale red and of beautiful fragrance, and the fruit is in the form of four drupes covered by a fleshy enclosure. A species known as Indian heliotrope is an Asiatic plant, but now grows wild in the Mississippi valley. It has hairy leaves.

HELIOTROPE.

HELIOTROPE, or **Bloodstone**, a form of quartz allied to chalcedony or jasper. The color is usually deep green with red spots. It is highly prized for seals, signet rings, and various other purposes. Deposits occur in practically all countries, but the finest specimens come from Asia, particularly from Persia, Tartary, and Siberia.

HELL, the place of punishment for the wicked after death. The term is used with more or less distinctness in nearly all forms of religion, though the precise nature of the punishment varies widely. The three most common views are that it is a place where a future life is to be spent in eternal misery

with no idea of moral retribution; that the offenders punished there for deeds done in this life may escape after a period of torment, and that it enters as an important factor in the moral government of the universe, serving as a place or condition in which the wicked are punished rigorously. The terms used in the Hebrew from which translators have drawn in compiling different works are sheol, meaning a grave or pit; and gehenna, a term referring to the valley of Hinnom. The Greek hades, the unseen, is now used with its original meaning, and those said to enter there are thought to pass into an unseen or invisible state. In the New Testament gehenna is translated into the word hell, which is described as a place where the fire is not quenched. It is especially stated hell was instituted as a place of punishment for the devil and his angels.

HELLESPONT. See **Dardanelles.**

HELL GATE, the name of a formerly dangerous pass in the East River, between New York and Long Island. In 1885 the obstruction was removed by extensive submarine mining and the use of powerful explosives. As these obstructions no longer interfere with the passage of vessels, much value has been added to the East River for navigation purposes.

HELMHOLTZ (hĕlm'holts), **Hermann Ludwig Ferdinand von**, physiologist and physicist, born in Potsdam, Germany, Aug. 31, 1821; died in Berlin, Sept. 8, 1894. He studied medicine at the Military Institute of Berlin, and, after being attached to a public hospital there, returned to his native town as an army physician. He was appointed professor of anatomy in the Academy of Fine Arts at Berlin in 1848, and in 1849 became professor of physiology at Königsberg, where he made much progress in investigating the rapidity of propagation of nerve excitement. In 1855 he was appointed professor of anatomy at Bonn, and in 1858 became professor of physiology at Heidelberg. He was elected to the professorship of physics at Berlin in 1871, and there, as elsewhere, wrote many works of scientific value. His writings are principally on the sciences, including elaborate works relating to physiology, physics, and anatomy, besides special treatises on optics and acoustics. He also prepared several exhaustive texts on mathematics. Helmholtz demonstrated that thought is not instantaneous, that putrefaction takes place independent of living microscopic organisms, and discovered the cause of the vowel sounds of the human speech. King William conferred a patent of nobility upon him in 1883. Among his writings are "Popular Lectures on Scientific Subjects;" "On the Conservation of Energy;" "Theory of the Impressions of Sound;" "Manual of Physiological Optics;" "Sensations of Tone;" "Course and Duration of Electric Currents," and "The Combination of Tones."

H. L. F. HELMHOLTZ.

HELOTS (hē'lŏts), the name applied to the slaves in ancient Sparta, which had authority to assign them to citizens and alone had power to dispose of their life and freedom. They were employed largely by citizens in agricultural and mechanical pursuits, but also bore arms. They gave evidences of especial bravery during the Peloponnesian War, for which they were granted liberty. See **Sparta.**

HELSINGFORS (hĕl'sĭng-fôrs), an important seaport of Russia, capital of Finland, on the northern shore of the Gulf of Finland. It is a flourishing trade and railroad center, contains an excellent harbor, and engages largely in the manufacture of woolen and linen goods, sail cloth, machinery and tobacco. The trade in fish, lumber, and corn is important. There are numerous fine schools and churches, and many valuable public buildings. It was founded in the 16th century by Gustavus I. of Sweden. Population, 80,895.

HELVETII (hĕl-vē'shī), the ancient people who inhabited the regions now occupied by Switzerland. They were of Gellic or Celtic origin. In 58 B. C. Julius Cæsar, then governor of Gaul, came in contact with them. At that time they attempted to emigrate in large numbers from their possessions and occupy southern Gaul, but were defeated by Cæsar at Bibracte, in Burgundy, and made subject to Roman authority. In the "Commentaries" written by Cæsar an account is given of these people. Later they refused to recognize Roman supremacy, which caused Vitellius to send General Cæcina to subdue them. After that the Helvetii disappear from history and their territory was occupied by the Alemanni.

HEMANS (hĕm'ănz), **Felicia Dorothea**, poetess, born in Liverpool, England, Sept. 25, 1794; died near Dublin, Ireland, April 26, 1835. She showed extraordinary taste for poetry, wrote several ballads at the age of six years, and published her first volume of poems in 1808. In 1812 a second edition of poems appeared, entitled "Domestic Affections." In the same year she married Captain Hemans, who removed to Italy in 1818 on account of his health and family difficulties, and the two never met after that. Subsequently Mrs. Hemans resided with her five children in North Wales and Dublin. Her poetry is descriptive and thoughtful, and much of it is perfect in pathos and sentiment. Among her best known productions are "Hymns from Childhood;" "Scenes and

Hymns from Life;" "Graves of a Household;" "Treasures from the Deep; " "Vespers of Palermo," and "Siege of Valencia."

HEMLOCK, a genus of poisonous plants, having a tall, hollow stem and white flowers in compound umbels surrounded by an

POISONOUS HEMLOCK.

involucre of three or more leaflets. The best known species is the poisonous hemlock, or spotted hemlock, found extensively in waste places in Eurasia, but now naturalized in America. This variety grows from two to six feet tall, has a spotted stem, and closely resembles parsnip in its root growth. The poison contained in the different varieties is an alkali, which causes weakness and later death by paralysis. Extracts of the leaves and fruit have valuable medicinal properties, and are used as powerful sedatives. The Grecians administered capital punishment by giving a decoction of hemlock to criminals, and this is the form of death which Socrates died. In medical practice it is now used as a substitute for opium. It is valuable in cases of chronic rheumatism, whooping cough, and in treating cancerous and other sores. The hemlock spruce, a species of spruce, is a widely distributed and valuable evergreen tree of North America. It yields large quantities of lumber.

HEMP, a class of plants with unisexual flowers, native to Asia, but now naturalized in all portions of the world. Hemp is cultivated extensively in the United States, Italy, Russia, and many other countries. It is an annual plant and varies in height from two to twenty feet, according to climatic conditions. The quantity of seed sown per acre is from one to two bushels. It is drilled in rows for the reason that the male plants mature earlier than the female, the latter growing larger and requiring a month longer to ripen the seed. A pithy matter fills the stem, the latter being constituted of woody fibers and covered with a fibrous bark. In India it is cultivated for the narcotic drug commonly called hashish (q. v.), and in other countries largely for the fibers, which are useful in the manufacture of sail cloth, ropes, cordage, and other coarse fabrics. The finer varieties are used extensively in manufacturing shirting, sheeting, and other fabrics suitable for wearing apparel and household purposes. These products are coarser than those made from flax fibers, but they may be bleached with equal success and are much more durable. The seeds produced by the female plant yield an oil highly valuable for mixing paints, varnish, and in the manufacture of soap and illuminating products. Cage-birds are fed chiefly with hemp seed. Kentucky is the principal hemp producing state. Manila and sisal hemp are not classed with the true hemps.

HENDERSON, a city in Kentucky, county seat of Henderson county, on the Ohio River, 148 miles west of Frankfort. Being the focus of several railroads, it has a growing trade in produce and merchandise. It is surrounded by a fertile agricultural country, contains excellent schools, numerous churches, and several fine county buildings. Electric lights and street railways, pavements, and waterworks are among the improvements. The chief manufactures are cotton and woolen goods, vehicles, ironware, machinery, and spirituous beverages. Population, 1900, 10,272.

HENDERSON, David Bremner, soldier and statesman, born in Old Deer, Scotland, March 14, 1840. He came with his parents to Illinois in 1846, settled in Iowa three years later, and there attended the public schools and the Upper Iowa University. In 1861 he entered the Union service as a private, and was discharged in 1863 on account of a severe wound received in action. He reentered the army as colonel in 1864 and rendered valuable services. In 1865 he was admitted to the bar, became assistant United States district attorney in 1871, and was elected to congress as a republican in 1883. Subsequently he was reëlected a number of times. When Thomas B. Reed retired from congress in 1899, Henderson was selected to succeed him as speaker of the house of representatives. He was an influential and efficient member of various important committees, and takes high rank among the speakers and legislators of the United States. In 1901 he made an extended visit to Europe.

HENDRICKS, Thomas Andrew, statesman, born near Zanesville, Ohio, Sept. 7, 1819; died in Indianapolis, Indiana, Nov. 25, 1885. In 1841 he graduated from South Hanover College, studied law, and was admitted to the bar in 1843. In 1850 he took part in the state convention to revise the Indiana constitution. He was a member of congress from 1851 to 1855, where he served on sev-

eral important committees, and was appointed commissioner of the United States land office by President Pierce. In 1863 he was elected to the United States senate, and there developed much influence as a democratic leader. The same party elected him governor of Indiana in 1872, defeating Thomas M. Brown, and afterward he practiced law at Indianapolis until 1884, when he was elected vice-president with Grover Cleveland. His death occurred before the expiration of the first year of his term.

HENGIST AND HORSA (hĕng'gĭst), two leaders of the Germanic invasion of England, which occurred in 449. The following year they defeated the native tribes near Stamford. Hengist was a prince of the Jutes, and Horsa, his brother, held an important command in the army. The latter was defeated and slain at Eaglesford, now Aylesford, in 455. However, Hengist conquered much of the country and reigned thirty years. His successes led to a large immigration of the Teutons.

HENLEY, William Ernest, poet and essayist, born in Gloucester, England, Aug. 23, 1849. He was educated in his native town, began writing for the London magazines, and in 1877 became editor of "London." In 1889 he was engaged as editor of the "Scot's Observer," and also contributed to the "Saturday Review" and other magazines. He was appointed editor of the "New Review" in 1894. St. Andrew's University granted him a degree in 1893. His writings include "Views and Reviews;" "Song of the Sword;" "English Lyrics," and "London Types."

HENNEPIN (hĕn'ẹ-pĭn), **Louis**, eminent explorer, born in Ath, Belgium, about 1640; died in Utrecht, Holland, in 1706. He became a member of the Franciscan order, preached at Halles, Belgium, and at the battle of Seneffe, between the prince of Conde and William of Orange, in 1674, was regimental chaplain. About that time he secured orders to preach at Quebec, Canada, and, after coming to America, founded a convent at Fort Frontenac. In 1679 he accompanied the La Salle expedition to Niagara, and sailed with it on Lakes Erie, Huron, and Michigan, proceeding as far as to the mouth of the St. Joseph River. In 1680 he sailed with two men in a canoe down the Illinois River to its mouth, and thence up the Mississippi River, but the three fell into the hands of Indians and were carried by them to the country occupied by the Sioux. While on this trip he discovered the Falls of St. Anthony, and, after spending eight months among the savages, was rescued by a party and taken to Green Bay by way of the Wisconsin River. In April, 1682, he reached Quebec and soon after sailed to France, where he published a description of Louisiana. Later he secured an appointment to the convent of Renty in Artois, but subsequently returned to Holland, and resided for a time in England. His historical works are of much value, but contain various assumptions and exaggerations. His later publications embrace "New Discovery of a Vast Country in America" and "New Voyage in a Country Greater than Europe." The latter went through numerous editions and was extensively read in many languages.

HENRY, the name of seven sovereigns of the former Germany, the first of whom is known as king of Germany, and the others as Holy Roman emperors.—Henry I., king of Germany, born in Saxony in 876; died in Memleben, in 936. He succeeded his father, Otto, of Saxony, in 912; greatly enlarged the influence of Germany, and was making preparation to claim the imperial crown of Rome when his death occurred.—Henry II., Holy Roman emperor, born in 972; died in 1024. He became duke of Bavaria in 995, and, after the death of Otto III. succeeded to the German crown in 1002. In 1014 he was crowned emperor by Benedict VIII., with the title of Holy Roman emperor.—Henry III., Holy Roman emperor, son of Conrad II., born in 1017; died at Botfeld in 1056. In 1039 he ascended the throne of Germany, exercised marked power in the church and state, and asserted the supremacy of the German states in European affairs.—Henry IV., Holy Roman emperor, son of Henry III., born in Goslard, Nov. 11, 1050; died in Liege, Aug. 7, 1106. He succeeded his father in 1056 under the regency of his mother. His reign is noted for the prolonged struggles resulting from religious differences. In 1070 he assumed supreme control, but was generally opposed by the people. He had at his disposal a well equipped army, with which he continued to operate until his supremacy was established. Pope Pascal II. induced his son, Conrad, to revolt. Conrad succeeded in defeating the army of his father and confined him as a prisoner, but Henry escaped and died soon after.—Henry V., Holy Roman emperor, son of Henry IV., born in 1081; died at Nimeguen in 1125. He was appointed as the successor of Henry IV., because his elder brother, Conrad, had revolted, and in 1165 succeeded to the throne. His reign was marked by religious differences with the popes of Rome, which were somewhat allayed by the concordat of Worms in 1122, but broke out anew some years later.—Henry VI., Holy Roman emperor, son of Frederick I., born in 1165; died at Messina in 1197. He succeeded to the German crown in 1169, and was recognized as a military leader in the third Crusade, which occurred in 1190. The most interesting event of his reign was a campaign against Italy and Naples, during which he greatly extended the boundaries of his empire.—Henry VII., Holy Roman emperor, born in 1262; died at Buonconvento, Aug. 24, 1313. He was the son of Henry II., count of Luxemburg; was elected to the throne of Germany in 1308, and

crowned emperor in 1312. After adjusting internal complications, he started on an expedition to subdue Naples, but died before accomplishing his designs.

HENRY, surnamed The Lion, duke of Saxony, born in 1129; died at Brunswick in 1195. He was the son of Henry the Proud, a nobleman. In 1146 he was recognized head of the Guelphs and became duke of Saxony and Bavaria, though the latter did not become a part of his dominion until in 1154. His possessions occupied the region extending from the Adriatic to the Baltic and North Seas, which gave him prestige as the most powerful prince of Germany. In 1166 a league was formed against him by various princes, who feared his authority, but these he was able to withstand. Besides founding Munich and various other cities, he encouraged industry and promoted commerce. He granted trade advantages to Lübeck and Hamburg, and was a patron of learning.

HENRY I., king of England, youngest son of William the Conqueror, born at Selby, in Yorkshire, in 1068; died near Rouen, France, Dec. 1, 1135. He was proclaimed king in 1100, while his elder brother was absent on a Crusade, and conciliated the Scotch by marrying Matilda, daughter of Malcolm III., king of Scotland. In his reign occurred a war with France, which terminated to his advantage by a treaty of peace in 1113. The Normans and English became united into one people within this period. He was succeeded by his nephew, Stephen, the count of Blois.

HENRY II., king of England, son of Matilda by her second husband, born in Le Mans, France, March 5, 1133; died at Westminster, July 6, 1189. His father was Geoffrey Plantagenet, and Henry was the first king of that line. He was crowned on Dec. 19, 1154, and reigned prosperously until a long struggle arose with Thomas à Becket regarding church subserviency, in which Henry was only partially successful in making the state superior in power to the church. After the death of Becket, he reigned successfully and is regarded among the most able English kings. His two sons, Henry and Richard, in 1173, being encouraged by their mother, raised a rebellion against him. After being defeated in a battle, he submitted to his adversaries, and died shortly after. He was succeeded by his son, Richard I.

HENRY III., king of England, grandson of Henry II., eldest son of King John, born Oct. 1, 1207; died at Westminster, Nov. 16, 1272. He succeeded his father on the throne at the age of ten years, and like him possessed a character notorious for weakness and unfitness for his high station. His long reign of fifty-six years was disturbed more or less by frequent insurrections and local differences. He was succeeded by his son, Edward I.

HENRY IV., king of England, first of the house of Lancaster, born in Bolingbroke, April 4, 1366; died at Westminster Abbey, March 20, 1413. From the place of his birth he was surnamed Bolingbroke, became earl of Derby in 1386, and married Mary de Bohun. In 1390 he took part in a war in Tunis and the Barbary States, fought with the Crusaders, and in 1398 was banished for supporting Richard II. against Gloucester. The following year he usurped the crown by securing from Richard II. an abandonment of his claims. His reign of fourteen years was marked by numerous insurrections, oppressive taxation, and severe laws against heretics. His death occurred after a severe affliction of leprosy and epilepsy. His son, Henry V., succeeded him as king of England.

HENRY V., king of England, eldest son of Henry IV., born in the castle of Monmouth, Aug. 9, 1388; died in Vincennes, France, Aug. 31, 1422. He succeeded his father in 1413, after distinguishing himself in the war against the Welsh. His successes caused him to become successively king's lieutenant in Wales, constable of Dover in 1409, and captain of Calais in 1410. prolonged struggles between the dukes of Orleans and Burgundy for the throne of France led Henry to devote the greater part of his energies to the purpose of securing possession of the French crown. He landed a large army near Harfleur on Aug. 11, 1415, which cost him 15,000 men, and caused him to begin his return to England by way of Calais. At Agincourt a large French army intercepted his progress. This he completely routed on Aug. 25. He made a second invasion of France in 1417, winning decisive victories, and in 1421 crossed the English Channel a third time for the purpose of supporting his brother, the duke of Clarence. Before the end of that year all of Normandy was in possession of the English, his army occupying Paris. About the same time a son was born to him, who succeeded him as Henry VI. History accords Henry V. a place among the brave warriors of England. His life, though largely influenced by the excitement of war, exhibits examples of patriotism and religious devotion.

HENRY VI., king of England, born in Windsor, Dec. 6, 1421; died in the Tower, May 22, 1471. His father died when young Henry was but nine months old, his uncle, the duke of Bedford, becoming governor of France, and his uncle Humphrey, duke of Gloucester, protector of England. In 1429 he was crowned at Westminster and the following year at Paris. Immediately a war with France began, in which the heroism of Joan of Arc inspired the French hosts to victory, which resulted in the loss of all the English possessions in France, except Calais. King Henry married Margaret of Anjou, daughter of Rene of Provence, in 1445. His reign is marked by incompetence and lack of judg-

ment. Among the few good things he did are the establishment of Eton College and of King's College. The latter is a branch institution of Cambridge.

HENRY VII., king of England, first sovereign of the Tudor line, born at Pembroke Castle, in South Wales, Jan. 21, 1456; died April 22, 1509. He was a son of Catharine of France, the wife of Henry V., and Owen of Tudor, and succeeded Richard III. in 1485, after landing a force at Millford Haven and slaying the king in the battle of Bosworth. He married Elizabeth of York, thus uniting the houses of Lancaster and York. The reign of Henry was disturbed by repeated insurrections, but within the period the agricultural interests were encouraged and the internal resources of the country began to attract wider attention. Laws were also enacted to curtail the influence of the feudal nobility. These measures made it possible for the middle classes to enjoy greater prosperity. Later a general suppression of the influence of the aristocratic party tended to enlarge his own power in the nation. In the general prosperity of the country no one profited more than he, since at his death the estate of the family was valued at $10,000,000. However, few of the English kings did more for industrial and commercial improvements, and none were more earnestly devoted to the establishment of justice.

HENRY VIII., king of England, second son of Henry VII., born at Greenwich, June 28, 1491; died Jan. 28, 1547. The rival claims of the York and Lancaster lines were united through his mother, Elizabeth of York, and, when his brother Arthur died, in 1502, he became heir apparent. At the age of twelve he was betrothed to Catharine of Aragon, the widow of his brother, and in 1509 succeeded his father. Personally he possessed many strong points, since he had been educated with considerable care, was a pronounced Englishman, and had a reputation for much personal beauty. During the first twenty years of his reign his prime minister, Wolsey, pursued a policy of making England important as a mediator between France and Spain, and within this time occurred the meeting between Henry and Francis at the Field of the Cloth of Gold (1520) and the battles of Pavia and Rome. In 1520 Henry decided to divorce Catharine. This step was taken for various reasons, the alleged causes being that she was older than he and had been his elder brother's wife. Besides, she had borne him no male heir. However, it is probable that he wanted a divorce because of having formed an attachment to Anne Boleyn. In his design to become separated from Catharine he was refused sanction from the pope, which caused the separation of England from the Roman Church to take form. Next he referred his case to the universities. Through these he obtained an affirmative decision, and the marriage with Catharine was annulled in 1533. About the same time the marriage with Anne Boleyn was declared lawful, but the pope still refused to recognize the marriage and parliament came to his rescue with two acts—one in 1534, setting aside the papal authority in England, and another in 1535, by which Henry became head of the church in England. By suppressing the monasteries he inflicted a severe blow to Catholicism and England became Protestant.

Next Henry became enamored of Jane Seymour, and Anne Boleyn was executed in the Tower in 1536, the marriage with Jane Seymour having been solemnized the day before. The birth of Prince Edward in 1537 gave Henry an heir apparent, but his mother died soon after. In 1540 Henry contracted his fourth marriage, with Anne of Cleves, in accordance with negotiations conducted by Thomas Cromwell for the purpose of gaining the Protestant influence of Germany. The unfortunate relations between Anne of Cleves and Henry resulted in a divorce, and also caused the execution of Thomas Cromwell. Catharine Howard now became Henry's fifth wife, but she was executed on a charge of infidelity in 1542. His sixth wife was Catharine Parr, whom he married in 1543, and she had the good fortune to survive the king. An alliance between France and Scotland plunged England into a war. Henry renewed his alliance with Charles V. of Germany, but the latter withdrew soon after and the war continued until 1546, when a treaty was negotiated. Among the persons to suffer death through the designs of Henry are such men as More, Wolsey, Cromwell, Fisher, and Surrey. He reigned thirty-eight years, but died unmourned by the people. His son, Edward VI., succeeded him as king.

HENRY I., king of France, son of King Robert, born about 1011; died Aug. 14, 1060. He succeeded to the throne in 1031. His reign was disturbed by several wars with Robert II. of Normandy. His son, Philip I., succeeded him.

HENRY II., king of France, second son of Francis I., born in St. Germain, March 31, 1519; died July 10, 1559. He married Catharine de Medici in 1543, succeeded his father, Francis I., in 1547, and immediately proceeded to strengthen the army for successful operation against the English. After securing the assistance of the Guises, he captured Calais in 1558, after that city had been in possession of the English 210 years. The following year he was fatally wounded by accident in a tournament and died soon after.

HENRY III., king of France, third son of Henry II., born Sept. 19, 1551; died Aug. 2, 1589. Under the influence of his mother, Catharine de Medici, he became a zealous advocate of the Catholic faith, and was active in promoting the causes that led to the Massacre of St. Bartholomew. His

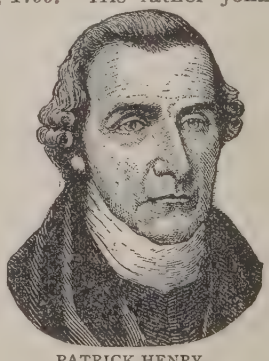
mother succeeded in bringing about his election to the throne of Poland in 1573, but he fled from Cracow when his brother's death occurred, and succeeded him as king of France in 1575. His reign was disturbed by religious fanaticism, numerous riots, and continuous contentions between the Catholics and Huguenots. Jacques Clement, a Dominican friar, made an assault upon him, stabbing him with a knife, from the effects of which he died the following day.

HENRY IV., king of France and Navarre, called The Good and The Great, born in Bearn, France, Dec. 14, 1553; died May 14, 1610. His mother was a Calvinist and exercised much care in selecting his instructors, and, to remove him from Catholic influences, took him to La Rochelle, where he joined the Huguenot army, taking part in the battles of Jarnac and Moncontour. The Protestant party selected him their chief, but because of his youth Coligny remained principal in command. He married Margaret of Valois, sister of Charles IX., in 1572, and his life was spared in the Massacre of St. Bartholomew only on condition that he would embrace the Catholic faith. This he did apparently with the intention of saving his life, since he sought every possible means to escape from the court of France, where he was held a prisoner, and succeeded in 1576, when he promptly joined the army of the Huguenots. When Henry III. died, his right to the throne was disputed, and opposition did not cease until he made a formal recantation of Protestantism in 1593, and in 1594 he was received at Paris as king. Civil war continued nearly four years after. In 1598 a treaty of peace was concluded between Spain and France, and in April of that year Henry signed the edict of Nantes, by which religious liberty was granted to the Protestants. His reign from this on was characterized by general prosperity. He encouraged internal unity, built canals and highways, established commerce, reformed the civil service, improved the tax laws, and opened new sources for the accumulation of wealth. Long periods of war had left a depressive effect, which he overcame, but his life was unsuccessfully assailed nineteen times, when a fanatic named Ravaillac succeeded in taking it. The people became delirious with grief and wrecked fearful vengeance upon the murderer and his sympathizers. Henry IV. is celebrated as the most beneficent king of France.

HENRY, Caleb Sprague, clergyman and author, born in Rutland, Vermont, Aug. 2, 1804; died March 9, 1884. After graduating from Dartmouth College in 1825, he studied at New Haven and Andover, and was ordained minister of the Congregational Church in 1829. He held several important pastorates, among them those at Greenfield and Hartford. In 1836 he was elected professor of philosophy at Bristol College, and was chosen to a like position in the University of New York, serving there in 1849-52. As a magazine and general writer he holds a high rank. His works include "Compendium of Christian Antiquities;" "Social Welfare and Human Progress;" "Ancient and Modern History;" "Epitome of the History of Philosophy;" "Moral and Philosophical Essays," and "Satan as a Moral Philosopher."

HENRY, Joseph, physicist, born in Albany, New York, Dec. 17, 1799; died in Washington, D. C., May 13, 1878. A fund for the purpose of defraying the expenses of his education was secured by him while working in a jewelry store. After attending the Albany Academy, he began to experiment in electricity, and in 1830 invented the electro-magnetic telegraph. In 1832 he was elected to the chair of natural philosophy at Princeton, and in 1846 became secretary and director of the Smithsonian Institution at Washington. He was president of the Society of Natural Science in 1868, and also of the Washington Philosophical Society, in 1871.

HENRY, Patrick, orator and patriot, born in Hanover county, Virginia, May 29, 1736; died June 6, 1799. His father John Patrick, came from Scotland. After attending the common schools, he undertook the study of a classical course, but discontinued it to engage in business as a storekeeper and farmer. In these enterprises he failed, studied law, and in 1760 became a lawyer. In 1763 he attracted attention as an opponent of excessive taxes, and was elected to the house of burgesses in 1765, where he delivered addresses against the stamp act. In 1774 he became a member of the first continental congress, which met at Philadelphia, in which body he delivered several orations that were worthy of the cause he advocated, in one of which he expressed the sentiment, "Give me liberty or give me death." In 1776 the state of Virginia voted for independence, largely on account of his untiring efforts. The following year he was elected governor of the state, was reëlected four times, and in 1787 led the party opposed to the federal constitution, this course resulting from his devotion to democracy and state privileges. In 1794-95 he was a United States senator, served as a member of the legislature a number of years, and declined the position of secretary of state offered him by President Washington in 1795. Though excelled in constructive statesmanship by several prominent men of



PATRICK HENRY.

Virginia, he ranked above them as an orator able to stir and sway the passions of an assemblage.

HENRY THE NAVIGATOR, fourth son of King John I. of Portugal, born in Oporto, March 4, 1394; died Nov. 12, 1460. In 1415 he took part in the conquest of Ceuta. After the death of his father he resided at Sagres, near Cape St. Vincent. During the war with the Moors of Africa he cruised on portions of the ocean never before navigated. For the purpose of disseminating knowledge in geography, he established schools of navigation and an observatory at Sagres. In 1418 he sent an expedition of his pupils on a voyage of research, which resulted in the discovery of Puerto Santo and the Madeira Islands, and a few years later of the Azores. In 1433 his navigators doubled Cape Bojador. Another expedition discovered Caple Blanco in 1441 and Cape Verde in 1445. Later he directed expeditions that partially explored Senegal and Gambia, established commercial relations with West African natives, and prepared the way for Portugal to develop a large commerce and secure important colonial possessions.

HEPTARCHY (hĕp'tärk-ỹ), a frequent appellation of the seven principal kingdoms established in England by the Saxons. These established governments did not all exist simultaneously, nor were they entirely independent of each other. They included Essex, Sussex, Mercia, Wessex, Kent, North Umbria, and East Anglia. In 827 they were united by King Egbert of Wessex, who assumed the title of king of England.

HERALD, an officer employed in ancient and mediæval times to carry messages of courtesy or defiance between sovereigns or persons of knightly rank, to challenge to battle, and to proclaim war or peace. In more recent times the official duties of a herald included the granting of arms, marshaling processions and public ceremonies, treating and drawing up genealogies, recording the creation and succession of peers and others, and to determine and regulate all matters in connection with the use of armorial bearings. It is probable that the office originated as early as the origin of coat-armor. In England heralds are appointed by the earl-marshal. Most European countries still continue the office of a herald, but the duties are modified from those pursued in former times.

HERALDRY (hĕr'*a*ld-rỹ), the science that treats of blazoning or describing armorial bearings or coats-of-arms, and of determining genealogies, precedent, and other matters in connection with titular rank. Historians trace the origin of heraldry to remote antiquity, and find it practiced by the early Egyptians and the twelve tribes of Israel, and exemplified by the Roman eagles. It is probable that signs and emblems were first used for clans and families to distinguish each other, each bearing different coats-of-arms. During the Crusades it was necessary to use heraldic arms extensively for the purpose of distinguishing the commanders of the different military organizations from each other, which led to an extensive adoption of heraldric practice in western Europe. The coats-of-arms borne consisted of an escutcheon or shield, on which were displayed the emblems to distinguish the different commanders or bands of warriors. Besides indicating the rank of the bearer, many also designated the name and residence, and others the country or province in which the ruler held sway. The Herald's College was incorporated in England in 1484, and in it was vested the power to inquire concerning rights and titles in heraldry, to regulate the use of heraldric devices, and to inquire into claims and violations growing out of the system. The rules now recognized by the college are modified largely from those first enforced, but in many respects they are similar to those of other European courts.

HERAT (hẹr-ät'), a city of northwestern Afghanistan, on the Hari-Rud River, about 370 miles west of Cabul. It is surrounded by a rich agricultural and fruit-growing country, has an important market, and is famous as a strategic military and political stronghold. Its trade is controlled chiefly by the Hindus, and consists largely of rice, wool, dyes, indigo, asafœtida, and leather. The imports from Europe include principally ironware, machinery, textile fabrics, and sugar. Though not extensive, the local manufactories are noted for their production of cloaks, harness, carpets, shoes, sword-blades, and sheepskin caps. Timour founded the city. It was the capital of Afghanistan for many years, but at present is the capital of the western division. Population, 45,500.

HERBART (hĕr'bart), **Johann Friedrich**, philosopher and author, born in Oldenburg, Germany, May 4, 1776; died in Göttingen, Aug. 14, 1841. At an early age he gave evidence of natural ability as a student, studied under Fichte at Jena, and in 1805 became lecturer in philosophy at Göttingen. In 1809 he was appointed to the chair of philosophy at Königsberg, but returned to Göttingen in 1833, remaining there until his death. While at Göttingen he established and conducted a seminary of pedagogy in which he promulgated his views on teaching and psychology. His system became known as realism, as opposed to contemporary idealism. The views of Herbart include those of concentration, apperception, and the epoch theory, under which each individual life is supposed to live again and manifest all the different stages of development in human history. All studies are classified into formal and content studies, and their efficiency to influence right development is carefully investigated. Herbart regards history the most potent study in developing

child character; next to it nature studies, and lastly, the formal studies, such as reading, writing, and arithmetic. With the decline of Hegelianism in Germany the system of Herbart became very influential, and is still intensely popular. In the United States the many lectures and writings of Herbart have received more attention than any others within recent years, and have given a tendency to educational thought. His greatest work is "Pedagogics." Among his other writings are "Introduction to Philosophy;" "Text-book of Psychology;" "Universal Metaphysics," and "Encyclopædia of Philosophy."

HERBERT, George, religious poet, born in Montgomery Castle, Wales, April 3, 1593; died in February, 1632. He was educated at Westminster and Cambridge, became a minister, and secured an appointment as pastor in 1626. Among his many beautiful productions are "The Temple" and "Country Parson."

HERBERT, Hilary A., statesman, born in Laurensville, South Carolina, March 12, 1834. He studied at the universities of Alabama and Virginia, was admitted to the practice of law, and served in the Confederate army until 1864. In 1878 he was elected to congress as a democrat, and served continuously until 1893, when he was appointed secretary of the navy by President Cleveland. Subsequently he resumed the practice of law.

HERCULANEUM (hĕr'cū-lā'nę-ŭm), an ancient city of Italy, situated about five miles southeast of Naples, near Mount Vesuvius. A vast eruption greatly damaged it in 63 A. D., and in the reign of Titus, in the year 79, it was totally buried by the lava flowing from the volcano. It was entirely forgotten until 1709, when its site was discovered by a well being dug at Pesina. The city lies under from thirty-five to one hundred feet of ashes, but in 1713 some relics were found. In 1738 the first extensive excavations were commenced. Since then much work has been done, and many works of ancient art have been secured from the entombed city.

HERCULES (hĕr'cū-lēz), or **Heracles**, celebrated hero of Greek mythology, son of Zeus and Alcmena, and the great-grandson of Perseus. He was born in Thebes, where he was reared, but incurred the animosity of Hera, who was jealous of all who rivaled her in the affection of Zeus. Alcmena, to protect the child, placed it under the care of a faithful servant, but Hera sent two poisonous snakes that crept unperceived to the cradle of the sleeping child. As these reached the infant, he grasped a snake in each hand and strangled both. Later he was assigned to serve Eurystheus, son of Hera, who placed many difficult tasks upon him, and by them developed great strength.

The tasks are known as the twelve labors of Hercules, and comprised the following: 1. To capture alive a wild boar that ravaged the vicinity of Erymanthus. 2. To slay a lion spreading desolation near Mycenæ. 3. To clean the stables of Augeas, in which 3,000 oxen had been kept for many years. 4. To capture alive a stag with golden horns and brazen feet, that was noted for its swiftness. 5. To destroy the Lernæan hydra. 6. To capture alive a wild bull in the island of Crete and bring him into Peloponnesus. 7. To kill the birds native to Arcadia, which ate human flesh. 8. To secure from the Amazon queen a girdle she had obtained from Mars. 9. To capture the human-flesh eating mares of Diomedus. 10. To obtain the golden apples from the garden of the Hesperides. 11. To bring to Argos the numerous flocks of the monster Geryon, king of Gades. 12. To bring the three-headed dog, Cerberus, from the infernal regions.

Hercules not only did all these tasks, but many others equally celebrated, and aided Zeus in obtaining a victory over the Giants. Afterward he became the slave of Omphale, queen of Lydia, by whom he was restored to liberty, and afterward married her. His death resulted from a poisoned robe infected with the blood of the Centaur, Nessus, by which he became crazed, and, after throwing himself upon the funeral pyre of Mount Œta, he was carried into heaven, where he became reconciled with Hera and married her daughter, Hebe. In statuary he is represented in many different conditions and stages of life, but is always presented in a form to convey the idea that he possessed great strength and energy.

HERCULES, Pillars of. See **Gibraltar**.

HERDER (hĕr'dęr), **Johann Gottfried**, celebrated author, born in Mohrungen, near Königsberg, Germany, Aug. 25, 1744; died in Weimar, Dec. 18, 1803. He studied under Kant at Königsberg, acquired an extensive knowledge of Oriental languages and literature, and in 1764 became professor at the cathedral school of Riga, and later lectured on surgery in St. Petersburg, Russia. He is one of the most prolific of German writers, producing extensive works in literature, history, and poetry. His writings include "Light, Love, Life;" "Recent German Literature;" "Critical Forests;" "Spirit of Hebrew Poetry;" "Poems, Songs and the Cid," and "Philosophy of the History of Man." The last named has been extensively translated, and is one of the most valuable productions ever written on that subject. Herder was an associate and friend of Goethe, Wieland, and Jean Paul.

HEREDITY (hĕ-rĕd'ĭ-tў), the tendency possessed by animals and plants to resemble the ancestral stock in all essential characteristics. There is in each animal or plant a tendency or peculiarity that gives evidence of its being of the same species as others, and even variety, though minute differences are certain to arise. These dissimilarities in some cases tend to be reproduced in successive generations, but generally the move-

ment is in a contrary direction, reproducing a reversion to ancestral types. Darwin, Herbert Spencer, Hæckel, and Wallace have written extensively on this subject, and have introduced heredity as a doctrine into zoological study. See **Embryology, Evolution.**

HEREFORD (hĕr'ę-fȯrd), a town of England, in a county of the same name, and surrounded by a productive farming and stock country. It was long noted on account of its strong garrison. There are several educational institutions and a fine cathedral dating from 1079, having a frontage of 325 feet. It has manufactures of leather, gloves, and hardware. The celebrated Hereford cattle, noted for their meat and production of milk, are native to the vicinity of Hereford. The city has pavements, several fine schools, and railway connections. Population, 20,580.

HERKIMER (hĕr'kĭ'mẹr), **Nicholas**, soldier of the Revolution, born in Herkimer county, New York, about 1720; died Aug. 17, 1777. He descended from German parents, became lieutenant of militia in 1758, and distinguished himself at Fort Herkimer, on the Mohawk, when the fort was attacked by the French and Indians. During the Revolutionary War he rendered valuable services, conducting a successful expedition against Sir John Johnson in 1776, and on Aug. 5, 1777, was mortally wounded in an expedition against Fort Stanwick (now Rome), from which he died twelve days later. In 1884 a beautiful monument was erected to his memory under a joint appropriation of congress and the New York legislature.

HERMANN, Johann Gottfried Jakob, educator and philologist, born in Leipsic, Germany, Nov. 28, 1772; died Dec. 21, 1848. He studied at Jena, where he became professor of philosophy in 1798, and was made professor of eloquence at Kiel in 1803. His distinguished ability attracted a large number of students, while his publications cover a diversity of subjects, and have had a marked influence upon the educational thought of Europe. He introduced a method of treating Greek grammar that was adopted generally, and had its influence upon Latin and even modern languages. Among his writings are several text-books of German and Greek grammar, a work on philology, and treatises on the works of Homer, Aristotle, and Euripides.

HERMIT, a term applied to a person who retires from society to live in solitary contemplation and devotion. The word was probably derived from Paul the Thebaid, who lived for many years as a recluse in the deserts of Egypt, dying there at the age of 113 years. St. Anthony and other historic characters were imitators of the first hermit, and from them the name has gone into general use.

HERMIT CRAB, the name applied to several species of crustaceans, found most commonly in the tropical seas. Each individual of the family consists of a fleshy mass, and for protection occupies the cast-off univalve shell of suitable size, which it carries until its size is too large, when it takes up its abode in one larger. See **Crab.**

HERMON, Mount, the most elevated mountain of Syria, rising 9,150 feet above the Mediterranean. It belongs to the Anti-Lebanon group. The modern name is Jebel-esh-sheikh. It is mentioned in the writings of Moses by the names Sion and Hermon.

HERO, the beautiful priestess of Aphrodite at Sestos. She was met at the festival of Venus and Adonis by Leander, a youth of Abydos, on the opposite shore of the Hellespont. The two became deeply enamored of each other, and every evening Hero placed a lamp in the top of the tower, which served to guide Leander as he swam across the water to meet her. The lamp was blown out one stormy night and Leander perished, and, when Hero saw the dead body, she was overcome with anguish and threw herself into the waves. The story has formed a favorite subject for many excellent productions in literature.

HEROD (hĕr'ọd), **The Great**, king of the Jews, second son of Antipater, born about 72 B. C.; died in 4. He was a native of Ascalon, and appointed by Julius Cæsar as governor of Galilee. Augustus confirmed him in his kingdom after the battle of Actium, when he immediately began to rebuild the temple at Jerusalem. Not only did he add much beauty to the temple, but likewise improved the city by pavements, gardens, and a stately theater. In the year 4 B. C., immediately following the birth of Christ, the historic massacre of the children of Bethlehem occurred. Later he perpetrated cruelties upon his own family, dissolved the national council, and caused dissatisfaction by appointing and removing high priests without regard to the succession laws. His reign included a period of thirty-seven years.

HEROD AGRIPPA I. See **Agrippa I.**

HERODOTUS (he-rŏd'o-tus), historian of ancient Greece, born at Halicarnassus, in Asia Minor, in 484 B. C.; died at Thurii about 420. He traveled extensively on the shores of the Mediterranean, visiting also Scythia, Syria, Palestine, Egypt, Ecbatana, and Babylon for the purpose of studying the geography and general history of the people. Later he returned to his native town, where he wrote his great history, which has given the world a wide range of knowledge regarding ancient peoples, particularly those of Egypt, Assyria, and Babylonia. His works were written in the Ionic dialect. They are noted for their lively grace and vigor, and exhibit proof of moral dignity. The abrupt ending of his history gives evidence that he died suddenly. His writings have been translated by the great scholars into all the learned languages, and form a valuable portion of the work studied in schools and col-

leges. He is esteemed by scholars for the marked beauty of his style, the scrutinizing care in treating details, and the narrative method used in detailing historic matters.

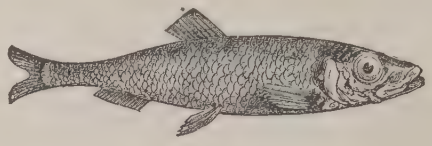
HERON (hĕr'ŭn), a wading bird allied to the flamingoes, storks, and spoonbills, belonging to the genus ardea. There are numerous species widely distributed. The green heron is a native of North America, and also the great heron, sometimes called the great blue heron. In all species the bill is longer than the head, sharp and straight. The common heron has a grayish color, black quill feathers, glossy plume, and measures about three feet from the bill to the end of the tail. It builds its nests in trees, but some nest on low bushes, laying three to four eggs. The different species inhabit ponds, marshes, fresh-water streams, and lakes, and also abound on the seashore.

GREEN HERON.

They feed on insects, frogs, fish, rats, mice, the young of other birds, and mollusks. Some varieties are esteemed for table use, but they are not generally eaten, except by natives.

HERRICK (hĕr'ĭk), **Robert**, poet, born in London, England, Aug. 20, 1591; died in October, 1674. In 1620 he secured a degree at Cambridge, formed a friendship with Ben Jonson, and devoted himself to the writing of poems, of which he produced about 1,200. Among his best known productions are "Hesperides;" "Noble Numbers;" "Ripe Cherries;" "Knight Peace to Julia;" "Gather the Rose-Buds While Ye May," and "To the Virgins." The two last named have been set to music.

HERRING, the name of a large family of soft-rayed abdominal fishes, of which the common herring of the North Atlantic is the most valuable. The head is one-fifth its total length, small teeth in both jaws, upper side blue-green in color, and length from eight to twelve inches. They are remarkable for rapid propagation. As many as 70,000 eggs have been found in a single female. They travel in schools, live on the small animals of the sea, and are widely distributed. The herring fisheries of the North Sea and the North Atlantic are the most important. There they accumulate in large



HERRING.

groups to spawn in the summer months, when they are caught in countless numbers by fishers, and are preyed upon by sharks, seals, whales, and predatory birds. The small eggs are heavy, cling together, and settle on rocks, shells, and other solid surfaces at the bottom of the water. It is thought that the herring used for food subsist mainly on minute crustacea and small fishes. The artificial propagation of herring has attained to much success and is pursued extensively. As a food fish the herring is of much value, and is utilized largely for curing as well as for fresh consumption. In Norway the annual catch aggregates 1,000,000 barrels. Other extensive herring fisheries are found off Nova Scotia, Holland, France, New England, and in the North Sea.

HERSCHEL (hẽr'shĕl), **Caroline Lucretia**, sister of Sir William Herschel, born in Hanover, Germany, March 16, 1750; died Jan. 9, 1848. In 1772 she came to Bath, England, where she assisted her brother by teaching music, and later developed an interest in astronomical study. The king of England granted her a salary of $200 a year for assistance rendered in astronomical research. Between 1786 and 1805 she discovered eight comets; five of them were discovered for the first time by her. She returned to Germany in 1822. In 1828 she received a gold medal from the Astronomical Society, and was similarly remembered by the king of Prussia in 1846.

HERSCHEL, Sir John Frederick William, astronomer and physicist, only son of William Herschel, born March 7, 1792; died May 11, 1871. At the age of seventeen he entered Cambridge, where he pursued an advanced course of study, and in 1822 began astronomical observations with the instruments and appliances of his father. By the end of 1833 he had re-examined the stars discovered by his father, and added over 530 nebulæ and double stars to the list, of which he published a catalogue. Later he decided to explore the heavens of the south, for which purpose he went to the Cape of Good Hope, and there established an observatory. In 1847 his discoveries were published, the work containing photographic pictures and descriptions of numerous valuable researches. He published "Treatise on the

Theory of Light;" "Treatise on Sound;" "Study of Natural Philosophy;" "Astronomical Observations at the Cape of Good Hope," and "Outlines of Astronomy."

HERSCHEL, Sir William, celebrated German astronomer, born in Hanover, Germany, Nov. 15, 1738; died in Slough, England, Aug. 23, 1822. He was the son of a musician, and received a professional education in music in Hanover under the direction of his father. In 1757 he became a teacher of music at Leeds, England, but later established himself at Bath, where he became interested in astronomy, and in 1781 discovered a planet by using a reflecting telescope of his own make. Shortly after George III. granted him a pension of $2,000 a year and later knighted him, while Oxford bestowed upon him a degree. In his work he was assisted by his sister, Caroline (q. v.). His discoveries include that of Uranus, the two satellites of Saturn, the periods of rotation of Venus and Saturn, and the rotation of Saturn's ring. He also discovered the constitution of nebulæ and of the Milky Way. In 1785 he began the construction of a great telescope. He published many treatises and scientific papers. His chief works include "A Catalogue of Double Stars;" "Comparative Brightness of Stars and Nebulæ," and "Information on the Nature of Light and Heat."

WILLIAM HERSCHEL.

HESIOD (hee'sĭ-ŏd), a poet of ancient Greece, who lived in the 8th century B. C. He was born at Ascra, near Mount Helicon, a village in Bœotia. It is thought he lived about the time of Homer. His poetry is largely didactic and includes "Shield of Heracles;" "Works and Days," and the "Theogony." The last named is a collection of the early fables concerning the birth of the gods.

HESPERIDES (hĕs-pĕr'i-dēz), in Greek mythology, the daughters of Atlas, who dwelt in the far West, but their number is unknown. They were appointed by Hera as guardians to a tree bearing golden apples, which had been presented to her by Gæa when she married Zeus. To kill the dragon that assisted in guarding the apples was one of the twelve labors of Hercules, who took the fruit and brought it to Eurystheus, but afterward Athena restored it. Ægle, Arethusa, and Hesperia are the names generally attributed to the Hesperides.

HESSE (hĕss), or **Hesse-Darmstadt**, a grand duchy of Germany, containing an area of 2,966 square miles, and a population of 1,124,600. Hesse-Nassau divides it into two separate portions, the most northern of which is entirely inclosed by that state. The Rhine, Main, and Neckar are the chief rivers. Among the principal cities are Darmstadt, the capital, and Bingen, Mentz, Worms, and Giessen. The soil is productive and yields large quantities of cereals, grasses, and fruits, particularly of the vine. Among the minerals are manganese, iron, and peat, while its manufacturing industries produce furniture, shoes, chemicals, cotton and woolen goods, machinery, cigars, and leather. Two-thirds of the inhabitants are Protestants. Railroads and electric car lines are numerous. In 1567 the langraviate of Hesse was divided, from which the grand duchy of Hesse originated. It was formed into Hesse-Cassel and Hesse-Darmstadt in 1604. Napoleon enlarged the latter in 1806. In 1866 it was ceded to Prussia as one of the results of the Austro-Prussian war.

HESSE-NASSAU (hĕss-näs'sou), a part of the German Empire, being a province of Prussia, and formed by a union of the duchy of Nassau, Hesse-Cassel, and the free city of Frankfort. Cassel, the capital, Frankfort, and Wiesbaden are important cities. The surface is rich in soil and minerals, while the manufacturing industries are extensive. Population, 1,625,250.

HESSIAN FLY (hĕsh'an), a small dipterous insect, the larvæ of which are exceedingly destructive to rye, barley, and wheat. It is about an eighth of an inch in length, color brown, wings dusky-gray and fringed at outer sides, and males somewhat smaller than females. The eggs are laid in May and September on young plants, where they hatch after from ten to fourteen days, and the larvæ develop into flies in about ten days. The damage to growing crops occurs during the larval state, when the young suck the juices of the joints and roots. In many sections of the country the erroneous view is held that the Hessian fly was brought to America by the Hessians employed by the British in the Revolution. The first extensive ravages in America occurred in 1786 and 1789, but since then they have been quite destructive to small grain, except oats, at various times both in America and Europe.

HEWITT (hū'ĭt), **Abram Stevens**, statesman, born in Haverstraw, New York, July 21, 1822. After graduating at Columbia College, he was admitted to the bar, and soon after became associated with Peter Cooper in iron manufacturing. The company owned iron works at Trenton, Pequest, Ringwood, and Durham. In 1867 he was commissioner to the French Exhibition, married Peter Cooper's daughter, and in 1874 was elected to congress as a democrat, serving until 1886, except one term. He was elected mayor of New York City in 1886, and received a degree from Columbia College in

1887. While in congress he advocated tariff reform and internal improvements. He is noted for his extensive knowledge of iron manufacturing.

HEYSE (hī′zẹh), **Paul Johann Ludwig**, author, born in Berlin, Germany, March 15, 1830. He was educated at Berlin and Bonn, and in 1854 began to publish novels and dramas, "The Book of Friendship" being his first noted work. Among his publications are several dramas that have met with much favor. His chief writings include "Bride of Cypern;" "Children of the World;" "Verses from Italy;" "In Paradise," and "Wives of Schorndorf." He also made many translations of Italian poetry. His father, Karl Wilhelm Ludwig Heyse (1797-1855) is the author of "System of Philology" and other works.

HEZEKIAH (hĕz-e-kī′ah), the twelfth king of Judah. He was the successor of Ahaz, reigning from about 727 B. C. till his death in 698. His reign was successful, and in it were built the noted aqueducts at Jerusalem, idolatry was suppressed, and internal improvements were extended. He also defended Judah against the incursions of the Assyrians under Sennacherib.

HIAWATHA (hī-ą-wą′thà), a mythical personage mentioned in the legends of North American Indians, and regarded by them as a protector of their hunting-ground. Longfellow made the myth famous in his celebrated poem, "Hiawatha."

HIBERNATION (hī-bẽr-nā′shŭn), the state of torpor in which many animals that inhabit cold or temperate climates pass the winter. On the other hand, in dry and hot countries various animals pass into a similar condition in the hottest season of the year, this state being known as æstivation. Many species of insects hibernate—some in the egg, others in the caterpillar, and others in the chrysalis state. Hibernation is a physiological condition which is favored, but not produced, by cold. In severe winters many hibernating animals perish, since the temperature of their bodies is reduced to nearly the same degree as that of the surrounding atmosphere. Among the hibernating mammals are the porcupine, hedgehog, dormouse, badger, bear, and squirrel. Bats pass almost the entire winter in a state of sleep. Reptiles hibernate in both cold and temperate climates, which is also true of amphibious animals. Among the hibernating reptiles are the tortoises, lizards, crocodiles, and serpents. During hibernation the digestion and respiration is either almost or entirely suspended.

HICKORY (hĭk′ō-rў), the name of several species of forest trees, formerly classed with the natural order walnut. They grow to a great height, frequently one hundred feet, and are stately and beautiful. Unless barked, the wood is rapidly damaged by worms, but when cared for is of much value in the manufacture of whip handles, axles, shafts, cogged wheels, and for other purposes where a strong and durable wood is serviceable. Among the valuable hickory nuts are those borne by the shag-bark, or shell-bark, and the pecan, but the wood product of these species is also very valuable. They thrive in many parts of the Mississippi valley and regions farther east. The nutmeg hickory is a species common to South Carolina and elsewhere, but its fruit is of little value. Though an American tree, the hickory has been naturalized in Eurasia.

HIDES, the skins of animals, especially when considered material for leather or when made into leather. The trade in hides of cattle, horses, and other domestic animals has long been an important industry. At slaughter-houses the hides are removed from cattle, protected by a layer of salt, and transported to the tannery, where they are prepared for manufacture into boots, shoes, harness, belts, and many other articles for which leather is utilized. Formerly the chase supplied large quantities of hides, especially those taken from the buffaloes of North America and the wild horses of South America, but at present the leather used in manufactures is derived almost exclusively from domestic animals.

HIERO (hī′ē-rō), the name of two ancient Greek rulers of Syracuse. Hiero I. was a brother of Gelon and succeeded him in 478 B. C. His rule was despotic, but he patronized literature and learning. Pindar, the poet, celebrated his successes at the Olympian and Pythian games in several poetic writings. He died in Catana in 467. Hiero II. was a son of Hierocles, born about 306 B. C.; died about 216. He was chosen as general by the soldiers in 275, and in 270 became recognized as king. His rule was wise and just, being a constitutional monarchy. He encouraged the democratic tendencies of his time. In the first and second Punic Wars he sided with the Romans and aided them materially. After the battle of Cannæ he sent a supply of corn and money to Rome, assisted the city by sending an army against Hannibal, and later presented to the Romans a golden statue of Victory. He was the friend of Archimedes.

HIEROGLYPHICS (hī′ẽr-ō-glĭf′ĭks), a term originated by Greek and Latin scholars, and applied by them to the writings sculptured on buildings and monuments in Egypt. Subsequently it came to be applied to the writings of other peoples, including the picture-writings of the Mexicans, Peruvians, and North American Indians. The name originated because it was thought the Egyptian writings related exclusively to sacred subjects, and that they were legible only to priests. All attempts made by western peoples to read Egyptian hieroglyphics were abandoned in the 17th century, and these writings were wholly unknown until 1777, when the French discovered a stone among the ruins of Fort St Julien, near the Rosetta branch of the Nile,

which has since been called the Rosetta Stone, and is now in the British Museum. This stone contains an inscription of the coronation of Ptolemy V., and was probably sculptured in 95 B. C. There are four modes of ancient writing: the hieroglyphic, the hieratic, the demotic, and the Coptic. The hieroglyphic is the earliest, and is formed by figures of objects with various symbols. Hieratic writing is known as the priestly, and contains two symbols. The demotic form came into use in the 9th century B. C., and was used in commercial and social relations. Coptic writing is a form employed in the more recent period of ancient Egypt. On the Rosetta Stone the inscription is written in both the hieroglyphic and hieratic characters, and it furnished a key to hieroglyphic writing which enabled scholars to translate extensively from Egyptian monuments. The hieroglyphics found in Mexico and Peru are thought to have originated from Aztec kings. Their earlier forms consisted of picture designs, but later they became modified into alphabetical. It was thought by Baron Houghton (1809-85) and Stephan Ladislaus Endlicher (1804-49) that Assyrian and Chinese writings rose from the earlier hieroglyphics, and that the cursive forms now constituting their alphabet were derived from the sculptured forms of objects formerly employed on monuments and in temples. See Egypt.

HIGGINSON (hĭg'in-sŏn), **Thomas Wentworth**, soldier and author, born in Cambridge, Mass., Dec. 22, 1823. In 1841 he graduated at Harvard University and entered the ministry, but in 1850 became interested in anti-slavery agitation with Wendell Phillips, Theodore Parker, and other public men of that period. He joined the free state forces in Kansas in 1856, where he served as brigadier-general, and later was enthusiastic in the support of the Union during the Civil War. In 1862 he was made captain in a Massachusetts regiment, and soon after became colonel of the first regiment of freed slaves. While operating in Florida in 1863, he was severely wounded, compelling him to retire from the service. In 1880-81 he served in the Massachusetts legislature, contributed to the "Atlantic Monthly," and later wrote many works of historical and general interest. His writings include "Army Life in a Black Regiment;" "Book of American Explorers;" "Charge with Prince Rupert;" "Woman and Her Wishes;" "Young Folks' History of the United States;" "Men and Women," and "History of the United States." He held the position of state historian of Massachusetts for many years.

HILL, Ambrose Powell, soldier, born in Culpepper county, Virginia, Nov. 9, 1825; slain in battle at Petersburg, April 2, 1865. In 1847 he graduated at West Point, served in the Mexican War as lieutenant of artillery, and later took part against the Seminole Indians in Florida. He supported Virginia when it seceded in 1861, entering the service as colonel, and for bravery at the battle of Bull Run was promoted brigadier-general. Gallantry at Williamsburg in 1862 caused his promotion to the rank of major-general. For gallantry at Chancellorsville in 1863 he was made lieutenant-general, and received command of one of the three divisions into which the southern army was divided. His services were especially efficient at Cedar Mountain, Antietam, Gettysburg, and Petersburg, commanding at the last named city during its siege. While reconnoitering at Petersburg, he was shot from his horse and died immediately.

HILL, David Bennett, statesman and lawyer, born in Havana, New York, Aug 29, 1843. After receiving an academic education, he studied law, and was admitted to the bar the following year. In 1864 he was elected city attorney for Elmira as a democrat, and in 1871 to the state legislature. Subsequently he was mayor of Elmira, became lieutenant-governor in 1882, and succeeded to the office of governor when Grover Cleveland became president. He was elected governor in 1885 and 1887, and United States senator in 1891. In 1904 he gave hearty support to Alton B. Parker for president.

HILL, Benjamin Harvey, statesman, born in Jasper county, Georgia, Sept. 14, 1823; died Aug. 19, 1882. He graduated at the University of Georgia, practiced law, and became prominent as a statesman. In 1875 he was elected to congress, re-elected in 1876, and shortly after was chosen United States senator. He made several memorable speeches.

HILLSBORO, a city in Texas, county seat of Hill county, in the central part of the state. It has connection by several railroads, electric lights, waterworks, and a considerable trade in live-stock, cereals, and merchandise. The city is ornamented by a fine courthouse, and has fine schools and an academy. Population, 1900, 5,346.

HILO (hē'lō), an important seaport and the largest city of the island of Hawaii, situated on Byron Bay. There are some manufactures and a considerable trade. Its harbor is spacious. As to population it ranks second of the cities in the Hawaiian Islands. In 1900 the Hilo district, equivalent to a county in the United States, had a population of 19,785.

HIMALAYA (hĭm-ä'la-ya), meaning snow abode, the most elevated mountain system in the world, situated in the southern part of Asia. As a whole the system contains several parallel ranges, which have a length of about 1,500 miles and an average width of 180 miles. The Himalayas form a natural boundary between Thibet and India, contain numerous fertile valleys, and are the source of many important rivers, among them the Brahmaputra, Ganges, Indus, and Ghara, which belong to the watersheds tributary to

the Bay of Bengal and the Arabian Sea. The general height of the Himalayas is approached only by the Andean system of South America. They contain the most magnificent snow-capped peaks in the world. The highest elevations are Mount Everest, 29,002 feet, the highest mountain in the world; Mount Godwin-Austen, 28,250 feet; Knichinjinga, 28,160 feet; Dhwalagiri, 26,825 feet, and Nanda-Devi, 25,675 feet. Other peaks are thought to be as high or even higher than Mount Everest, but their exact altitude has not been ascertained. The geological structure consists largely of granite, with important deposits of mica slates and gneiss. Metamorphic rocks and more recent alluvial deposits occur at the lower slopes, while the entire region is rich in zinc, coal, copper, iron, petroleum, gold, silver, and other mineral deposits. Vast forests of spruce, pine, deodar cedar, silver fir, and deciduous trees abound in the regions having altitudes suitable to their growth. The Hindus regard the mountains sacred. Many pilgrims visit annually the sources of the Ganges and other localities especially interesting to them in religious rites and legends.

HINDU-KUSH (hĭn'dōō-kōōsh), a mountain range of Central Asia, lying west of the Himalayas, of which it is a continuation. The Indus River passes between them and the Himalayas. Their breadth is about 200 miles and length 370 miles, separating Afghanistan from British India. Hindukoh, north of Cabul, is covered perpetually with snow, and is regarded the culminating peak. Its height is 20,225 feet. Several tributaries of the Oxus River rise in the northern slopes of the Hindu-Kush, and from its southern slope flow the Helmund and the Cabul.

HINDUSTAN (hĭn'dọ-stän), a name applied to the Punjab and Ganges valley, but also used to describe the whole of British India. See **India**.

HIPPOCAMPUS (hĭp'pō-kăm'pus), a genus of fish allied to the pike, found in the Mediterranean and Atlantic. The head bears a curious resemblance to the head of a horse, and, when swimming, is held in a nearly vertical position. There are several species, most of which have a length of from seven to twelve inches. The young are hatched and reared for a time in a marsupial sack.

HIPPOCRATES (hĭp-pŏk'ra-tēz), celebrated physician of antiquity, the most distinguished among the Greek medical scholars, born in the island of Cos, about 460 B. C.; died in Larissa, Thessaly, about 375. He was the son of Heraclides, also a physician, and was instructed in medicine by his father and several others eminent in medicine and philosophy. Besides practicing and instructing in medicine, he traveled extensively in Greece, and finally settled at Larissa, where he remained until his death. His writings cover a wide range of subjects, and were quoted by both Plato and Aristotle. Numerous productions are variously attributed to him, but several are known to have emanated from his pen, among them "Aphorisms;" "De Morbis;" "Popularibus;" "Prognosties;" "De Capitis Vulneribus," and a number of others. As a practitioner Hippocrates exercised much care in regard to nursing and diet. He is credited with remarkable skill in diagnosing. Various writers assert that he held to the theory of critical days, and that he practiced auscultation. In his writings and practice he gave marked attention to a consideration of the importance of pure air, water, and food; care in regulating diet of persons afflicted with acute diseases, and the treatment of wounds with the view of guarding against undue loss of blood.

HIPPODROME (hĭp'pō-drōm), a word applied by the Greeks to the place where horse-and-chariot races were given for public exhibition. The hippodrome at Constantinople in the Byzantine period was especially noted, and corresponded generally to the Roman circus. In modern times the name is associated with the circus, but differs from it in that the exhibition consists mainly of horse-and-chariot racing and gorgeous displays by large vehicles.

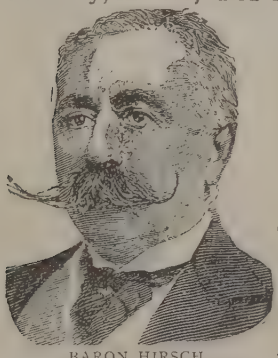
HIPPOPOTAMUS (hĭp-pō-pŏt'ā-mŭs), the river horse of Africa, a genus of a family of ungulates, which contains only two living species. One of these is large and

HIPPOPOTAMUS.

occurs in the swamps, rivers, and lakes of Africa, while the smaller species is found principally in the vicinity of Lake Tchad and the rivers flowing into the Atlantic Ocean. The larger species is characterized by a large head, small eyes and ears, thick skin, few hairs, and a reddish fluid exuding from the skin. It delights to swim and dive in the waters of lakes and rivers, and feeds on the plants growing in or near the water. In ancient times it was found in Lower Egypt, but its tendency to interfere with tilled fields has caused it to be driven from the cultivated portions. The size of the body is large, being next to that of the elephant, but its legs are very short; thus, it appears much smaller. While the length is often seventeen feet, it stands only from four to six feet high. Its feet are small, the hoofs short, and each foot has four toes.

The flesh is esteemed as food and is sought by the natives, who capture the animal by arranging pits from which escape is impossible. The feet and tongue enter into the manufacture of jelly, while the teeth furnish ivory, and the hide is serviceable for leather of a heavy kind. When not pursued, it is peaceable and apparently indifferent, but when attacked it becomes dangerous. Fossils of this animal do not occur in America, but there are remains of several extinct species both in Africa and Eurasia. Commentators on the Bible regard the behemoth mentioned by Job to be the hippopotamus now found in Africa.

HIRSCH (hĕrsh), **Maurice, Baron,** financier and philanthropist, born in Munich, Germany, in 1833; died in Pressburg, Austria, April 20, 1896. After securing an education, he married the daughter of a wealthy senator of Belgium, and by able financiering accumulated a fortune valued at $200,000,000. The untimely death of a son caused him to devote $20,000,000 to charity, and later he made benevolent appropriations of $100,000,000 to aid educational and charitable enterprises in Germany, Hungary, Russia, Galicia, and Roumania. In 1891 he founded a community of 700 Russian exiles at Woodbine, New Jersey, each family of which received thirty acres of land and the necessary farming implements. His wife, Baroness Clarade de Hirsch, died in Paris, France, April 1, 1899. At the death of her husband, in 1896, her fortune was estimated at $200,000,000, with an annual income of about $20,000,000. She continued the benevolence of her husband and devoted the bulk of her vast estate to the purpose of aiding in charities. Among the charitable enterprises is the Hirsch Fund, a fund amounting to $2,400,000, which is invested in United States securities, and the net income, about $10,000 a month, is loaned to immigrants of Jewish extraction.



BARON HIRSCH.

HISTORY, a systematic record or narration of events and circumstances relating to man, especially those having reference to his social and political conditions. In giving a record of the past it treats of facts concerning both nations and individuals, tracing to some extent the causes of the present condition of different peoples. As to accuracy, the facts related depend remotely upon contemporary witnesses and various circumstantial evidences. Although history as now understood is preserved in written form and is being added to constantly, it need not necessarily be committed to writing, as historic facts may be passed from generation to generation in the nature of story, when it is called tradition. This is substantially the form common among barbaric peoples, a circumstance due to their primitive mode of life and the absence of both desire and ability to preserve a written record of events. However, authentic history dates only from the invention of writing, whether uncial or cursive.

The ancients used hieroglyphic characters to inscribe important events on monuments, tombs, and temples. By them we have come into possession of valuable information touching their political and social life. However, ancient history as known to us is limited to a few nations and to a comparatively small area of the surface of the earth. The regions included comprise northern Africa, southern and western Asia, and southern Europe; the history connected with the other portions of these grand divisions is either mediæval or modern. There are evidences that America and Australia, as well as all the continents, were inhabited in the remote past, but our knowledge of the peoples occupying these regions is limited to the information obtained from fossil remains and ruins of temples and dwellings. This is true particularly of portions of America and Europe. It is evidenced in many remains met with in Peru, Mexico, and the Mississippi valley in America, and in various cliffs and lakes of Europe. Modern history is not only more extensive than that coming to us from the preceding periods, but it is vastly more accurate. This is due at least partly to the circumstance that early peoples studied to make their records artistic rather than instructive.

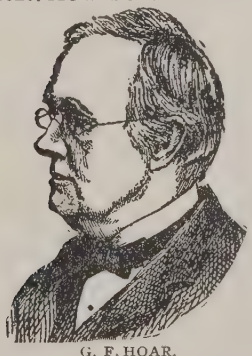
Writers have divided history into various classes, these serving to detail information according to style in writing or as related to time. Chronological history is a record of successive times; narrative history is a story of events or a series of events, and philosophical history considers the causes of events and traces their results. It is classed also as sacred and profane, the former being the history recorded in the Bible, and the latter that of secular events. As to time, history is either ancient, mediæval, or modern. Ancient history ends with the fall of the Western Roman Empire, in 476 A. D., including Jewish, Oriental, Greek, and Roman history. Mediæval history closes with the revival of learning and the Protestant Reformation, in 1517. Modern history includes the period from 1517 to the present. Biographical history treats of the lives of individuals.

HITCHCOCK (hĭch'kok), **Roswell Dwight,** theologian and educator, born in East Machias, Maine, Aug. 15, 1817; died June 16, 1887. In 1836 he graduated from Amherst College, was ordained pastor of the Congregational Church of Exeter, and

spent a year in the German universities of Halle and Berlin. He became professor of natural and revealed religion in Bowdoin College in 1852, traveled extensively in Eurasia, and in 1871 was elected president of the American Palestine Exploration Society His writings include "Life of Edward Robertson;" "Socialism," and "Hymns and Songs for Worship."

HOANG-HO (ho-äng-hō'), or **Yellow River**, one of the important rivers of China, rises north of Thibet, flows toward the Khingan Mountains, thence south to the Pe-ling Mountains, and thence northeast into the Gulf of Pe-chi-li. Its banks are protected by levees, but it often overflows, the most noted of its inundations occurring in 1887. The entire length is 2,700 miles, and the area of its basin 200,000 square miles, which constitutes one of the most productive and populous regions of China. It is designated Yellow River on account of the quantities of yellow earth held in solution by its waters and carried as silt into the Yellow Sea.

HOAR (hōr), **George Frisbie**, jurist and statesman, born in Concord, Mass., Aug. 29, 1826. He was educated at Harvard University, admitted to the bar of Massachusetts in 1849, and in 1869 became a member of congress as a republican. He served in the house till 1877, when he became United States senator, and was re-elected in 1883, 1889, 1895, and 1901. He has taken a prominent part in national legislation, serving on many important committees, and became noted as an opponent of the Philippine policy of his party. He died Sept. 30, 1904.



G. F. HOAR.

HOBART (hō-bart), **Garrett Augustus**, statesman, born in Long Branch, New Jersey, June 3, 1844; died Nov. 21, 1899. He graduated from Rutgers College, studied law, and began the practice of his profession at Paterson, New Jersey. Shortly after he became city counsel. He served with distinction a long term of years in the state legislature, both in the house and senate, where he ranked as one of the most influential members. In 1896 he was placed on the ticket with William McKinley and elected to the vice-presidency. In 1869 he married Jennie Tuttle, daughter of Senator Tuttle.

HOBBIMA (hŏb'bi-ma), **Meindert**, celebrated painter, born in Amsterdam in 1630; died Dec. 14, 1709. His genius became recognized only recently, consequently his history is largely obscure. About 150 of his works have been catalogued, some of which have sold at high prices. His painting entitled "Avenue Middlehamais, Holland," is one of his finest productions, and is now in the national gallery at London. Other productions are in the museums of Brussels, Berlin, and St. Petersburg. Many of his subjects are landscapes, but all are characterized by admirable perspective and distinctive characters.

HOBOKEN (hō'bō-ken), a port of entry in Hudson county, New Jersey, on the Hudson River, immediately above Jersey City and opposite New York City. A number of European steamship lines start from Hoboken. It is an important coal and produce depot, and has a large trade in fruits, cereals, and live-stock. The manufactures include lead pencils, machinery, leather goods, coffins, paper, silk goods, and tobacco products. About 3,650 persons are employed in the manufactories, which represent a capital of $5,500,000 and produce annually $8,250,000 worth of goods. Extensive railroad connections, electric car lines, sewerage, street lighting, and a public library are among the facilities. Its school system is supplemented by Stevens Institute, St. Mary's Hospital, two convents, and the Passionate Fathers' monastery. The city was visited by a destructive fire in 1900, but the damaged parts were rebuilt on an improved plan shortly after. Population, 1900, 59,364.

HOBSON, Richmond Pearson, naval constructor, born in Greensboro, Alabama, Aug. 17, 1870. He was educated at the Southern University in his native town, and graduated from the Naval Academy at Annapolis in 1889. In 1890 he aided in construction work at Paris, studied two years in France, and returned to the United States in 1893, receiving an appointment as naval constructor while abroad. On June 3, 1898, he and seven men sank the Merrimac in the channel of the harbor at Santiago de Cuba, and thereby greatly aided in blockading the Spanish fleet. He published "Report on Disappearing Guns Afloat" and "Information Gathered Abroad by Students," the latter in six volumes.

HOBSON'S CHOICE, a phrase originating from Tobias Hobson, the first keeper of a livery stable in England. The "Spectator," a periodical published in London, related that Hobson had forty horses in his barn, and that he always kept near the door the one he wished to have used. Travelers coming to the barn were induced to allow him to choose the horse, when he always took the one nearest the door, hence "Hobson's Choice" came to signify an apparent rather than a real choice.

HOCHKIRCH (hōh'kīrch), a town in Saxony, Germany, famous on account of a battle fought there in the Seven Years' War, on Oct. 14, 1758. The Prussians under Frederick the Great were defeated by the Austrians under General Daun, but after retreat-

ing to the Heights of Drehsa, the Austrians were routed completely.

HOE, Richard March, inventor, born in New York City, Sept. 12, 1812; died in Florence, Italy, June 7, 1886. His father invented the printing press known by his name but the son made numerous improvements and thereby rendered the power press much more valuable. The Hoe lightning press, as completed by him in 1841, took high rank for its value in newspaper work.

HOG. See **Swine.**

HOGARTH (hō'garth), **William,** painter and engraver born in London, England, Nov. 20, 1697; died in Leicester, Oct. 26, 1764. After serving as an apprentice to a silversmith, he studied at Sir James Thornhill's school, and in 1720 began business by engraving coats-of-arms, designing plates, and preparing illustrations for booksellers. In 1730 he secretly married the daughter of Sir James Thornhill. His works are noted for inventive genius, clearness of design, and originality in detail. The most noted include "Distressed Poet;" "Modern Midnight Conversation;" "Rake's Progress;" "Strolling Actresses in a Barn;" "Enraged Musician," and "Marriage à la Mode." The last named is considered his best production.

HOHENLINDEN (hō-ẹn-lĭnd'ẹn), a village in Bavaria, Germany, twenty miles east of Munich. It is celebrated for the victory of the French over the Austrians, in which the latter lost 8,000 killed and wounded, while the French lost 5,000 men. It occurred on Dec. 3, 1800, and shortly after the peace of Lunéville was concluded.

HOHENZOLLERN (hō'ẹn-tsŏl'lẽrn), a province in southern Germany, forming an administrative district of Prussia. It has an area of 480 square miles, and a population of 79,850. The house of Hohenzollern, a princely family of Germany, derived its name from this region. It descended from Count Thassilo, who founded a castle on the Zollern Heights in the 9th century. This dynasty has continued in an unbroken line until the present. Emperor William II. of Germany is a representative, though the most distinguished name associated with it is that of Frederick II., the Great.

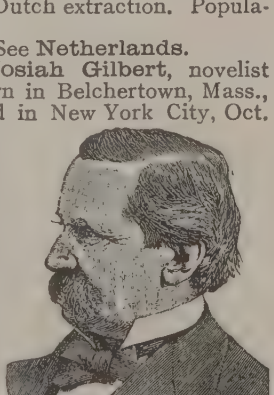
HOLBEIN (hol'bīn), **Hans,** eminent painter, born in Augsburg, Germany, about 1497; died in 1543. He was the son of Hans Holbein, called the Elder, who was also a celebrated painter. At the age of sixteen years the younger adorned churches and houses in Basel, and in 1526 went with Erasmus to England, where he met Sir Thomas More. After remaining three years at London, he returned to Basel, but again went to London in 1532. Henry VIII. made him royal painter, and, after producing numerous portraits, he was sent to Denmark to paint a portrait of Christina. Later he painted a celebrated likeness of Anna of Cleves. The wealth of color and exquisite expression put by Holbein into portraits place him in the rank of the great masters, but he also did splendid work in wood engraving. Among his most famous productions are the "Madonna," at Darmstadt; "Dance of Death;" "Solothurn Madonna;" "Family of Sir Thomas More;" "Archbishop Warham;" "Last Supper;" "Ambassadors," and portraits of Saul, Rehoboam, Samuel, and Hezekiah.

HOLIDAY, a day set apart for the commemoration of some important event, as a religious or national festival. Besides the Sunday or Sabbath, the more important are New Year's Day, Washington's Birthday, Good Friday, Decoration Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas. This list of holidays is observed in nearly all parts of the United States, but in most states others are quite generally observed, particularly Lincoln's Birthday, Lee's Birthday, Arbor Day, and Election Day.

HOLLAND, a city of Michigan, in Ottawa county, on the Black River, about three miles from Lake Michigan. It is the focus of several railroads, surrounded by a fertile country, and has a large trade in merchandise. The manufactures include leather, flour, ironware, machinery, and utensils. There are many churches, a fine public school system, and good municipal improvements, including electric lights, waterworks, and pavements. It is the seat of Hope College, an important educational institution of the Reformed Church, with an attendance of 275 students, and a library of 15,000 volumes. The city has a large number of citizens of Dutch extraction. Population, 1904, 8,966.

HOLLAND. See **Netherlands.**

HOLLAND, Josiah Gilbert, novelist and journalist, born in Belchertown, Mass., July 24, 1819; died in New York City, Oct. 12, 1881. He graduated from the Berkshire Medical College, at Pittsfield, Mass., and, after practicing medicine for three years, became superintendent of public schools at Vicksburg. In 1849 he engaged as editor on the "Springfield Republican," but sold his interest in 1856 and traveled in Europe. He established the "Scribner's Magazine" in 1870, which was succeeded by the "Century Magazine," on which he remained an editor until his death. While resident in New York, he was president of the board of education and chairman of trustees of the New York College. His writings were of a high moral tone and



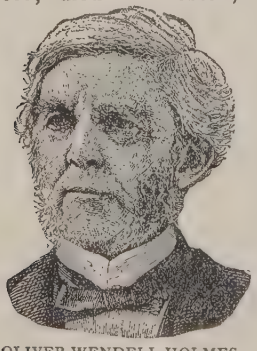
J. G. HOLLAND.

attained much popularity. Among his chief works are "History of Western Massachusetts;" "Bitter Sweet;" "Arthur Bonnicastle;" "Story of Seven Oaks;" "Letters to Young People," and "Complete Poetical Works."

HOLLY, a genus of plants that includes several species of evergreen shrubs or trees, found mostly in temperate climates. The leaves are glossy, flowers white, fruit mostly scarlet, and the tree from ten to forty feet high and of conical shape. Its ability to bear clipping makes it an excellent plant for hedges and fences that are kept dwarfed. The wood is white and hard, and is useful for knife-handles, musical instruments, and turnery work. From the bark a mucilaginous substance is secured, which serves in preparing bird-lime. The holly tree is widely distributed in the United States, Eurasia, and Africa.

HOLLYHOCK (hŏl'lĭ-hŏk), a plant native to China, but now cultivated extensively for its ornamental flowers in gardens and parks. Though perennial in warm countries, it is classed with the biennials in temperate climates. It has a tall, branchless stem, flowers either single or double on the upper part, and greatly variegated in color. As cultivated in gardens, it reaches a height of from five to eight feet, and is popular on account of its blooming until late in autumn. The leaves are rough and heart-shaped, sessile flowers large, and the corolla has five petals. In some countries the flowers are used in medicine.

HOLMES, Oliver Wendell, poet and essayist, born in Cambridge, Mass., Aug. 29, 1809; died in Boston, Oct. 7, 1894. His father, Abiel Holmes, was a Congregational minister, and his mother, Sarah Wendell, of Dutch ancestry. In 1829 he graduated from Harvard University and also studied medicine there and at Paris, and in 1836 received a degree. He became professor of anatomy and physiology at Dartmouth College in 1838, and in 1847 secured a chair in the Massachusetts Medical School, Boston, a position he held for thirty-five years. Holmes has a literary career that dates from his student days, when he developed skill in writing verse and short sketches. His writings have a characteristic vein of the beautiful and true in nature, and are always popular on account of the wit and wisdom displayed. As an instructor he took high rank, both his physiological and psychological instruction being of the highest character. In 1886 he visited Europe, and was received with marked distinction by scholars and the public. Cambridge, Edinburgh, and Oxford granted him degrees. His writings include "The Last Leaf;" "Chambered Nautilus;" "Autocrat of the Breakfast Table;" "Poet at the Breakfast Table;" "Professor at the Breakfast Table;" "Life of Ralph Waldo Emerson;" "Old Ironsides;" "Every Man His Own Boswell;" "Life of John Lathrop Motley;" "One Hundred Days in Europe," and "Over the Teacups."



OLIVER WENDELL HOLMES.

HOLST, Hermann Eduard von, historian and educator, born in Livonia, Russia, June 19, 1841; died Jan. 20, 1904. He graduated at Dorpat and Heidelberg, traveled extensively in Germany, but later came to the United States and engaged in literary work at New York. In 1872 he was appointed professor at the Strasburg University, and two years later secured a like position as teacher of history at Freiburg. Later he lectured on history at Johns Hopkins University, but again taught at Freiburg. In 1892 he was elected to the chair of history at the Chicago University, which he filled with marked success. His writings include "Constitutional and Political History of the United States;" "Constitution and Democracy of America;" "Life of John C. Calhoun," and "Constitutional Law of the United States."

HOLSTON (hōl'stŏn), a river of Tennessee, rises on the eastern slope of the Clinch Mountains, and at Kingston joins the Clinch River to form the Tennessee. Its length is about 200 miles, most of which is navigable for light-draft river boats.

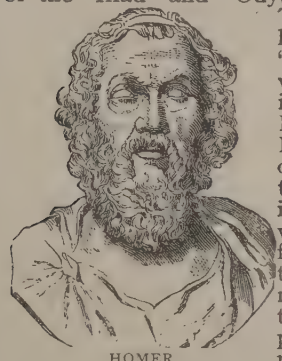
HOLY ALLIANCE, a league formed by Alexander I. of Russia, Frederick William III. of Prussia, and Francis of Austria on Sept. 26, 1815. It was concluded at Paris and signed by the sovereigns in their own hand. The purport of the league was to make the precepts of Jesus Christ the basis of administration, but the real purpose consisted of maintaining the power of the existing dynasties. The Holy Alliance came to an end by the events of 1848.

HOLYOKE (hōl'yōk), an important city of Massachusetts, in Hampden county, on the Connecticut River, eighty miles west of Boston. It has extensive transportation facilities by railroad and steamboat lines. The municipal facilities include electric lights, waterworks, a public library, and an extensive street railway system, by which it is connected with Springfield and other cities. The public schools rank among the best in the state, while its public buildings include many valuable and massive structures. Among the manufactures are machinery, cutlery, cotton and woolen goods, screws, rubber, sealskin, blank books, and wire. The capital invested in manufactories is $25,500,000, and 13,500 persons are employed. Population, 1900, 45,712.

HOLYOKE, Mount, a ridge situated in

Hampshire county, Massachusetts. It is about seven miles long. The highest point is 1,122 feet above sea-level. It separates Hadley and Amherst townships from Granby and South Hadley. Mt. Holyoke College is situated in Hadley township, on the northern side of the ridge, and is the oldest college for women in the United States. It was established in 1837, has thirty-five instructors, 415 students, and a library of 20,000 volumes.

HOMER, the earliest and most celebrated of Greek poets, and to whom the authorship of the "Iliad" and "Odyssey" is assigned.



HOMER.

There are several histories entitled "Lives of Homer," whose authorship is attributed to Herodotus and Plutarch, but it is quite certain that they are not genuine and possess value only because from them we learn the traditions commonly held in early times regarding the poet. His birthplace is claimed by many localities, among them Smyrna and Chios, but whether he was born there or at some other place claiming the honor is uncertain. It is generally agreed that Homer was a Greek of Asiatic birth, and that he belonged to the 9th century, being born probably about 850 B. C., or about 400 years after the Trojan War. Scholars have generally agreed that Homer was blind and that he did not write the productions attributed to him, but instead went from place to place and recited them before the people from memory. In this way they appear to have been handed down through successive generations until written and given to the world in substantially the present form.

Reference made to several local incidents and the dialect in which they appeared make it certain that both the "Iliad" and "Odyssey" originated on the Ægean islands and the Ionian coast of Asia. They were introduced at Sparta by Lycurgus in 776 B. C. At Athens the manner of their recitation was regulated by the laws of Solon. The frequency with which the "Iliad" and "Odyssey" are quoted by Grecian writers shows the high esteem in which they were held, and, while not strictly historical, they possess much value in their characteristic exhibit of the life, customs, and opinions of the people. The "Iliad" contains an account of an episode which covered about forty days of the siege laid by the Greeks for ten years to the city of Troy. This entire work consists of 15,681 lines. It begins with the rape of Helen by Paris, recounts incidents of the voyage to besiege the Trojan city, and ends with the death of Hector and the fall of Troy. In the "Odyssey" are 12,205 lines. This highly interesting work describes the return of Odysseus, or Ulysses, a hero of the Greeks, from the war against Troy. It recites the beginning of his voyage; his adventures with Polyphemus, a one-eyed monster; his numerous shipwrecks, and his final return to Ithaca. A famous edition of the "Iliad" and "Odyssey" was prepared for Alexander the Great by Aristotle. Both these productions have been translated into all the leading languages. The translations of Homeric poems made by Bryant and Pope are among the best in English.

HOME RULE, a term applied in British politics to the movement made by the Irish home rule party with the view of establishing a parliament in Ireland for the purpose of legislating in relation to local affairs, but subject to the imperial parliament of the empire. It designed to make the local government similar to that now common to Canada and Australia. The movement originated at Dublin in 1870, and four years later sixty members of parliament were elected who favored the home rule policy. In 1885 there were eighty-six members under the leadership of Parnell. The project received a new impetus by the support of Gladstone. A large party of Irishmen favor absolute independence, but the adoption of local self-government is held by many to be both feasible and of mutual interest to all concerned.

HOMESTEAD, a town of Pennsylvania, on the Monongahela River, eight miles above Pittsburg. The surrounding country produces large quantities of coal, which caused large steel, iron, and glass industries to be built up at Homestead. It is the seat of the steel works established by Andrew Carnegie, in which extensive labor disturbances occurred in 1892. The town has good municipal facilities, street railways, several schools and churches, and is noted especially for its extensive production of steel plate. Population, 1900, 12,554.

HOMESTEAD ACT, a law enacted in 1862 by the congress of the United States, under which it became possible for the head of a family, or any person at least twenty-one years of age, to acquire by settlement and improvement title to 160 acres of public land. The only condition provided is the payment of a registration fee, improvement as a residence, and occupation for five years. This law also carries with it the commutation privilege, by which title can be acquired to not more than 160 acres after fourteen months' occupation and the payment of $1.25 per acre, but $2.50 if situated within United States railroad grants. So-called homestead exemptions are recognized in all the states. These provide that a specified amount is exempt from execution for debt to the head of a family, but the amount in different states varies greatly.

HONDURAS (hŏn'dōō-rạs), a republic of Central America, bounded on the north and east by the Gulf of Honduras and the Caribbean Sea, south by Nicaragua and San Salvador, and east by Guatemala. It has a total area of about 43,300 square miles, and a population of 515,000. The climate is similar to that of Guatemala, being hot in the low regions and quite equable and pleasant where the country is elevated considerably. Among the valuable minerals are coal, gold, silver, cobalt, iron, zinc, and lead, but iron is the most important. Much of the soil is fertile. In the southwestern portion trend lofty mountain ranges, but the northern and eastern parts consist of valuable coast and valley lands. The rivers flow almost exclusively into the Gulf of Honduras and the Caribbean Sea, and include the Guangues, Cutchabutan, Roman, Tinto, Barba, Catago, and Cape rivers. Agriculture is the principal industry. The various products include sugar, coffee, tobacco, wheat, indigo, maize, rice, and a large variety of tropical fruits. The forests yield quantities of valuable dyewoods, tamarinds, cabinet woods, rubber, and vegetable ivory. Cattle raising and dairying are also important industries. There is a considerable foreign trade with the United States, Germany, and Great Britain, in the order named. Divers lines of railway have been constructed, by which the Gulf of Honduras is connected with Puerto Cortez and other interior points, and several lines also penetrate the coast and valley regions. Tegucigalpa is the capital. Other cities of importance are Comayagua, Juticalpa, Gracias, Truxillo, and Yoro.

Columbus discovered the region occupied by Honduras in 1502. After many years of Spanish dominion it finally became independent in 1821, since which time it has existed as an independent government. At present the republic comprises fifteen departments. A national constitution proclaimed in 1894 vests the chief executive authority in a president, who is elected by popular vote for a term of four years. The president is assisted by ministers of the interior, finance, war, public instruction and justice, and public works. Legislative authority is vested in a national congress, which is constituted of deputies elected by popular suffrage. There are a standing army of 500 men and a national militia of about 20,000. The inhabitants are largely of Spanish descent, and the dominant faith Roman Catholic, but religious liberty is extended to all. Education is gratuitous and nominally compulsory, and the official language Spanish. Besides the system of common schools, there are twelve colleges. Telephone and telegraph connections abound extensively, and a postal system is under the government direction. Much of the country is still unoccupied and open for development by stock-raisers and farmers.

HONDURAS, Bay of, an important inlet of Central America, extending from the Caribbean Sea. It is bounded largely by Honduras, Guatemala, British Honduras, and Yucatan. The bay contains several important islands, and on its shore are several growing seaport cities, including Truxillo and Tobuncana.

HONEY, a vegetable food product deposited by bees in the cells of their honeycomb. It is a sweet, thick liquid, quite clear and transparent, and when kept for some time solidifies into a granular white mass. The neuter bees collect the sweet juices of flowers by means of their proboscis; thence it is transferred to the honey-bag, and by certain chemical changes honey is produced, which is deposited in store for food during winter. When elaborated by young bees it is whiter than in other cases, and is called virgin honey. The product of older bees is more or less of a yellowish hue. The flavor of honey is dependent largely upon the plants from which it is collected. In many countries the culture of bees is an important industry, the milder climates being best adapted to the enterprise. Besides being a valuable food, it is used in medicine as a promoter of expectoration, with vinegar as a gargle, in pastry, and for the manufacture of mead. Both extracted and comb honey are sold in the market, while an artificial product is made of glucose placed in cells of wax. Where apiaries are kept, it is customary to prepare bee-food by cultivating clover and other plants. Clover is a favorite food plant because honey made from its flowers is almost white and of excellent flavor.

HONEY LOCUST, a leguminous forest tree widely distributed in the United States, found largely in the southern part of the Mississippi valley and the Atlantic coast plain. The flowers are greenish, the seed pod twisted, which sometimes is one to two feet long, and in it a number of brown seeds mature. The foliage is elegant in appearance; leaves pinnated. There are long thorns on the limbs, which make the plant a favorite for ornamental hedges and for fencing. The wood is of an inferior quality and decays rapidly. Several species of locusts grow to a height of eighty to one hundred feet, having fine spreading branches.

HONEYSUCKLE, a class of shrubs and twining plants, growing to a height of from ten to twenty feet. There are numerous varieties, of which the common honeysuckle is the best known. It is found largely in Eurasia and Africa, where it flowers from June to September. The flowers are red without and yellow within, tubular, and produce scarlet berries. This variety is cultivated extensively in every part of America and Eurasia. In North America there are nine different species of honeysuckle. The Australian honeysuckle is so called because of the sweet liquid found in the flowers. The trumpet honeysuckle is

cultivated largely in the United States as a twining plant in gardens and at porches.

HONG-KONG, or **Hiang-Kiang**, meaning sweet water, an island near the mouth of the Canton River, off the southeast coast of China, and forming a crown colony of Great Britain. The area is thirty-two square miles, and the total population 260,000, of which about 14,000 belong to the military and naval forces. Much of the surface is rocky and barren, the general elevation above the sea from 1,000 to 2,000 feet, and the harbor at Victoria spacious and commodious. Victoria is the capital. It extends several miles along the bay. Its harbor is one of the finest in the world, being strongly fortified, and it is the center of a vast trade. The local products consist of various manufactures, such as clothing, cigars, textiles, utensils, and machinery. Among its buildings are a government house, courthouse, cathedral, and a number of other public buildings. The island was ceded by China to the British in 1842 after the close of the opium war. Since then it has developed an enormous trade, the value of its annual export and import trade with Great Britain amounting to about $20,000,000 annually. There is an additional trade proportionately as large with the United States, Germany, Australia, Holland, and France. The public debt is $1,650,000.

HONOLULU (hō-nō-lōō′lōō), capital of the Hawaiian Islands, on the southern coast of the island of Oahu. The site is beautiful and the climate agreeable. Among its interesting buildings are the bishop's museum, Roman Catholic cathedral, and the government buildings. The harbor is well protected, giving the city considerable advantage in foreign trade. There are manufactures of clothing, earthenware, canned fruits and fish, and utensils. The general facilities include sewerage, electric lights, waterworks, pavements, public parks, rapid transit, and railroad connections. There are several fine schools and churches. It also has business colleges and institutions of higher learning. Population, 1900, 39,306.

HOOD, John Bell, soldier, born in Owingsville, Kentucky, June 1, 1831; died in New Orleans, Aug. 30, 1879. In 1853 he graduated at West Point, served against the Indians, and entered the Confederate army at the beginning of the Civil War as lieutenant, rising shortly after to the rank of lieutenant-general. He commanded at Gaines' Mill, Gettysburg, and Chickamauga, losing a leg at the latter place. In 1864 he succeeded J. E. Johnston, and on Sept. 1 was compelled to evacuate Atlanta. Sherman defeated him at Franklin and Thomas at Nashville, after which he was relieved of his command at his own request. He wrote "Advance and Retreat."

HOOD, Robin, the name of a bandit, who, with a band of followers, inhabited Sherwood Forest, Nottinghamshire, England. He is mentioned by many of the English poets. These bandits supported themselves by levying toll upon the wealthy settlers and by hunting in the forests. According to common account Hood lived between 1160 and 1247. The earliest poem based upon his adventures is the "Vision of Piers Ploughman," which was published about 1355. Among the associates of Hood were Little John, George-a-Greene, Friar Tuck, William Scadlock, and Maid Marian.

HOOD, Thomas, poet and humorist, born in London, England, May 23, 1798; died at Devonshire Lodge, May 3, 1845. He was first employed in a Russian merchant's counting-house, but owing to failing health returned to London. His education was conducted partly by two maiden ladies, but was largely self-acquired. In 1821 he became assistant editor of the "London Magazine," which furnished him ample means of development by associating with men of superior attainments, among them Lamb, Hazlitt, and De Quincey. While in a fair way to attain both financial and literary success, a business house failed that involved him in bankruptcy, and he resolved to acquire sufficient to pay off the debt by economical living in Germany. In 1835 he settled at Coblenz, but returned to London in 1840, when he became editor of the "New Monthly." Hood possessed a delicate fancy, full of graceful play, and had marked ability in punning and putting things in a caustic and entertaining way. His productions include "Death-bed Love's Eclipse;" "Plea of the Mid-summer Fairies;" "Hero and Leander;" "Bridge of Sighs;" "Eugene Aram;" "Song of the Shirt;" "Up the Rhine;" "Lay of the Laborer," and "Ode to Melancholy."

HOOKER, Joseph, general, born in Hadley, Mass., Nov. 13, 1814; died Oct. 31, 1879. He graduated at West Point in 1837, served with distinction in the Mexican War and was brevetted lieutenant-colonel. In 1853 he left the army, but at the beginning of the Civil War was appointed brigadier-general, and in 1862 became commander of a division in the army of the Potomac. His services at Yorktown, Williamsburg, and Malvern Hill caused him to be brevetted major-general. Afterward he held important commands in the battles of South Mountain, Antietam, and Fredericksburg. In 1863 he succeeded Burnside in command of the army of the Potomac, but, after his defeat at Chancellorsville, he was succeeded by General Meade. In 1865 he was brevetted a major-general and retired in March, 1868, with the full rank of major-general. He was brave, skillful, and patriotic in his military career.

HOOPOE (hōōp′ō), a genus of birds native to Eurasia and Africa, classed according to some with the honey-eaters and by others with the horn-billed birds. The bill is long and slightly curved, tail broad, eyes large,

and two nearly parallel rows of long feathers form a crest on the head. In most species the color is buff, but variegated with black and white. The male is about twelve inches long, somewhat larger than the

HOOPOE.

female, and more vivid in color. The nest is built in the holes of trees, in which five or six eggs of lavender-gray are laid. They feed largely on insects, worms, and filthy accumulations. The double whoop uttered has originated its name.

HOOSAC TUNNEL (hōō'sąk), an important railroad tunnel on the line from Boston to Troy, in the western part of Massachusetts. It is built through the Hoosac Mountain, a range extending into Massachusetts from the Green Mountains of Vermont. It was completed in 1875 at a cost of about $18,000,000, is nearly five miles long, and contains a double railway track.

HOOSICK FALLS (hōō'sĭk), a town of Rensselaer county, New York, on the Hoosick River, about twenty-six miles northeast of Troy. It is noted for its manufacture of farming machinery, utensils, knitted goods, and ironware. There are good schools and municipal improvements, and extensive connections by railway and electric car lines. Population, 1900, 5,671.

HOOSICK RIVER, a stream in eastern New York, flows toward the west, and joins the Hudson about fourteen miles above Troy. It is noted for its vast water-power, which is utilized extensively for manufacturing purposes in towns along its banks. The valley is highly fertile.

HOP-VINE AND FLOWER.

HOP, a species of plants of the hemp family, grown extensively in the United States, Eurasia, and other portions of the world. Its root is perennial, and annually sends forth long, weak, rough, twining stems. The flowers are male and female; the latter, occurring in cones, are greenish in color and constitute the hops sold in the market. These cones are gathered when ripe, and, after being carefully dried, are used to communicate an aromatic bitter flavor to beer. Hop culture is an important industry, and is pursued extensively in all civilized countries. Besides being used in the manufacture of beer, hops enter into the preparation of medicine on account of their tonic and narcotic properties. They are also placed in pillows to induce sleep. In some countries the young shoots are bleached and eaten like asparagus, while the fibers of older stems enter into the manufacture of cordage. Hops are an important ingredient in the manufacture of yeast for baking and general leavening purposes.

HOPKINS, Johns, philanthropist, born in Anne Arundel county, Maryland, May 19, 1795; died in Baltimore, Dec. 24, 1872. He descended from Quaker parents, engaged in successful business enterprises, and devoted a large share of his accumulations to philanthropic purposes. In 1873 he gave $4,500,000 to the establishment of a hospital in Baltimore, and by will bequeathed $3,500,000 to found the Johns Hopkins University (q. v.), one of the noted educational institutions of the United States. He also established an orphan asylum for Negro children and a public park in Baltimore.

JOHNS HOPKINS.

HOPKINS, Mark, educator, born in Stockbridge, Mass., Feb. 4, 1802; died June 17, 1887. In 1824 he graduated from Williams College, studied law at the Berkshire Medical School, and entered upon the practice of medicine in New York City. He was elected to the professorship of moral philosophy and rhetoric at Williams College in 1830, in which institution he remained until his death, but taught various branches of learning. In 1836-72 he served as its president, and in 1857 received an appointment as president of the American Board of Foreign Missions. Hopkins was an efficient and thorough educator, of whom his pupil, James A. Garfield, said: "A log with a student at one end and Mark Hopkins at the other was his ideal college." His name is commemorated by Hopkins memorial hall at Williams College. Among his published works are "Law of Love and Love as a Law;" "Evidences of Christianity;" "An Outline Study of Man;" "Strength and Beauty," and "Scriptural Idea of Man."

HOPKINSVILLE (hŏp'kĭns-vĭl), a city in Kentucky, county seat of Christian county, on several railroad lines, about seventy miles northwest of Nashville, Tenn. The

surrounding country produces large quantities of wheat and tobacco, and also contains extensive deposits of coal and iron. Among the manufactures are carriages, farming machinery, earthenware, flour, and tobacco products. It is the seat of the South Kentucky College, a state insane asylum, and two seminaries. There are good county buildings, several fine schools, electric lights, waterworks, and other improvements. Population, 1900, 7,280.

HORACE, Quintus Horatius Flaccus, distinguished Latin lyric poet, born near Venusia, Italy, Dec. 8, 65 B. C.; died Nov. 27, 8 B. C. His father was a slave who freed himself, and when the son was twelve years of age took him to Rome, where he secured a liberal education. Later he studied in Athens, and after the assassination of Julius Cæsar joined the army organized by Brutus. After the battle of Philippi he fled for safety, but when a proclamation of amnesty was issued, returned to Rome where he had been reduced to poverty by the confiscation of his parental estate. Soon after returning to Rome he secured a clerkship in the office of the quæstor, in which he attracted the attention of Virgil. The latter introduced him to Mæcenas, the minister of Augustus, who soon became his intimate friend. Soon after he was made poet-laureate by the Roman emperor, enabling him to live in comparative ease. Subsequently his attention was devoted exclusively to literature. His works include four books of "Odes;" eighteen "Satires;" two books of "Epistles;" a book of "Poems," and several others. His "De Arte Poetica," or "Art of Poetry," is sometimes classed with his "Epistles." The works of Horace have exquisite beauty of language, originality, and are finely mingled with common sense, humor, piety, wit, and shrewdness. There are many translations in all the leading languages. Several of his works are still studied in many high schools and colleges. No other Latin writer has furnished as many proverbial phrases as Horace, and no works surpass his in tender sentiment and exquisite style.

HOREB, Mount. See **Sinai.**

HOREHOUND (hōr'hound), a labiate plant domesticated in the United States, and noted for its downy leaves and stems, dense whorls of flowers, bitter flavor, and aromatic smell. It yields a volatile oil and a bitter fluid, which are used in the preparation of a tonic given as lozenges for coughs and colds. The plant is native to Eurasia and Africa, where it grows wild.

HORN, the name applied to a modifications of the epidermis in animals, as the hoofs and horns of ruminants, the spines of porcupines, and the claws of birds. These parts are constituted of substances similar to those forming the anatomical structure of animals, but differ from them in the proportion of their parts. There are three classes of horns borne for defense on the heads of animals—those composed of bone, as the antlers of the deer; those consisting of epidermis or skin formations, as the horns of the rhinoceros and the buffalo; and those partly bone and partly epidermis, as in the case of the cow. Horns are either solid or hollow, and differ also in that some are single, while others contain a number of branches or prongs. Generally the single horn is hollow, and those containing prongs are of solid or bone formation. In commerce the term horn is often applied to the hoofs, claws, nails, bills, and quills of animals, and also to the shell of the tortoise, but in a narrower sense it refers only to the appendages on the heads of animals. Horn formations contain both animal and mineral matter, are tough, may be softened by heat, and are usually semi-transparent. The horn growth differs widely in various animals, as, for instance, in the stag only the males have horns; in cattle both sexes have horns, but some species are hornless. In deer the horns are shed annually, while a horn once destroyed in cattle, goats, and sheep does not grow again.

In manufacture the various kinds of horns constitute an important and useful product. They are used in making handles for knives and forks, canes, umbrellas, and walking-sticks; for buttons, combs, snuff-boxes, pipe tips, and ornaments. Besides, they serve a useful purpose in preparing a convenient vessel for powder, and for hat racks and decorative articles. Horn is also a name applied to a large number of different kinds of wind instruments, which were made formerly of the horns of animals, but have fallen more or less into disuse. The musical instrument now designated by that name is manufactured largely in France. It consists of a metal wind instrument furnished with a mouthpiece and a bell. The Saxe horn and other military horns, as well as those used in bands, are usually some form of the French horn.

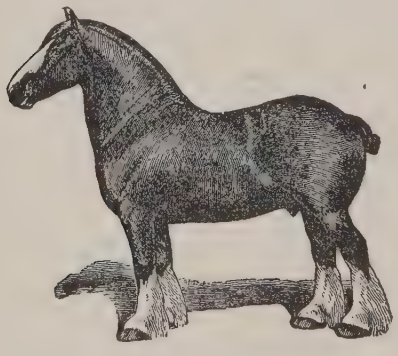
HORNBLENDE (hôrn'blĕnd), a subvariety of aluminous amphibole, and one of the five most abundant simple minerals of which rock is composed; the others are mica, quartz, feldspar, and carbonate of lime. It occurs in various forms, differing in the composition of its crystalline particles. In color it is greatly diversified. It is found as a constituent of trap rock, and with such metamorphic forms as granite and gneiss. Some species of hornblende are transparent, others opaque. The colors predominating are white, brown, and black.

HORNELLSVILLE (hôrn-ĕlz'vĭl), a city of New York, in Steuben county, on the Canisteo River, about fifty-seven miles south of Rochester. It is regularly platted, has electric lights and street railways, a public library of 15,000 volumes, and is connected with other cities of the east by important railroads. There is a growing trade in mer-

chandise. Among its industries are railroad shops, tanneries, glove factories, iron foundries, and manufactures of silk and woolen goods, pottery, and furniture. The public school system is well established. There are many fine churches and private residences. Population, 1900, 11,918.

HORNET, a stinging insect of the wasp family, but larger than the common wasp, being about an inch long. It also possesses a more venomous sting. The hornet is widely distributed in America and other grand divisions, has a brownish color with yellowish spots. Several species of Asiatic hornets attain to a length of fully two inches. Their nests are built in the large trunks of trees, in old walls, and some varieties construct a kind of paper work, which is hung in the branches of trees. They live in communities, which consist of about 200 insects. Hornets feed on the sap of trees, but also on fruit and honey, and prey on other insects. The sting is very painful, that of some varieties causing fevers in men and cattle.

HORSE, a genus of quadrupeds classed with the zebra and the ass. They are distinguished by an undivided hoof, mane on the neck, simple stomach, and lips and teeth



CLYDESDALE HORSE.

adapted for cropping short herbage. There are many kinds of horses, all of which are distributed more or less widely. They serve more important purposes than any other animal as beasts of burden and draft. It is thought that Central Asia is the nativity of the horse, but some contend that horses were first domesticated in Egypt. Writers generally agree in expressing the view that they were brought to western Europe early, a fact evidenced by remains found in caves in Switzerland and figures of horses cut on rocks. Scripture mentions them in connection with warfare, and with the arts of peace among the ancient Egyptians. Prior to the discovery of America horses were unknown in the western hemisphere. Those met with in a wild state in South America descended from animals introduced by Spanish settlers. Fossil remains found in America indicate that an animal similar to the horse existed in remote ages, but it was quite inferior; one species attained to a height of only about three feet. It is assumed that the horse developed from a small and inferior class of animals, about three feet tall, and that this early class is now extinct, the wild horses of Tartary and other regions being descendants of animals that escaped from domestication and gradually developed into the present wild and inferior form.

The horses of Arabia are classed as the most beautiful breed, and excel in swiftness, endurance, and perseverance. The European breeds came largely from importation of the Arabian, and have been more or less intermingled with the different classes previously common. In America horse-breeding has attained high development, and constitutes one of the important industries. Among the classes used for draft and agriculture are the Clydesdale, Norman, and Belgian; those used for speed embrace the Hambletonian, Morgan, and French coach; while the ponies include Shetland, Galloway, and Indian. These races of horses are interbred more or less with each other and with other grades, and represent classes possessing qualities of superiority for various purposes, including varieties almost strictly American, such as the Kentuckian. The horse is characterized by its acuteness of the senses, ability to observe danger, and strength of memory. By suitable food and careful treatment it can be made to serve man in all the arts of war and peace. The period of gestation is a trifle over eleven months, and the age of puberty is reached at two years. At the age of from three to four years the horse begins to come into its higher state of usefulness, but lives to an age to from twenty to thirty years, serving with more or less profit during the entire time after being broken for work.

Corn, hay, oats, barley, and beans constitute the principal food for horses, but they thrive well when given a variety of these and small quantities of linseed, bran, carrots, and straw. For driving and running purposes it is best to feed oats largely, while for heavy work corn is the staple food. Until about nine years old the age can be estimated by the marks on its teeth, but after that it is difficult to determine. Horse flesh is used for food in some countries; the hide is an important material for the manufacture of leather, and the tail and mane are utilized for hair cloth and upholsterers' products. The introduction of electric street cars, bicycles, and automobiles has lessened the use of horses to some extent, but, on the other hand, the development of natural resources in new countries has widened it correspondingly. The running record of American race-horses is among the best in the world. "Black Beauty," written by Anna Sewell, is one of the most beautiful works on the horse. Literature abounds with valuable and interesting productions relating to the horse and its uses.

HORSE RADISH, a perennial plant

having long stalks, cylindrical roots, and whitish flowers. It is cultivated in many portions of America, but grows vigorously in all kinds of soil after once getting a foothold. The roots possess medicinal qualities. They are used extensively as a condiment for table purposes. Their medicinal qualities are diuretic, stomachic, and diaphoretic. Several preparations are employed as external applications.

HORTICULTURE (hôr'tĭ-kŭl-tŭr), the art or science relating to the cultivation of garden plants for decorative and useful purposes. It is properly a branch of agriculture, and like the latter has made rapid progress in America. Many varieties of shrubs, flowers, and fruit-bearing trees have been naturalized in the different soils and climates, thereby rendering the garden and orchard more productive and profitable. In planting gardens and orchards it is essential to take into account the character of the soil, drainage, and the slope of the surface. Fruit trees usually thrive best in a rich, dark loam, while early crops and vegetables yield the best returns in a sandy loam. Systematic drainage is essential for the reason that cultivation is most effective in well drained surfaces, and freezing is thereby rendered less injurious to the growing trees. A slope facing the sun is preferable for orchards in some climates, but in northern latitudes, where frosts appear late in the spring, it is much better to select a slope toward the north for the reason that the early sap-flow occasioned by the warm sun in the early part of the year will, when followed by frost, cause a rupture of the cells and consequently result in damage to the tree. Thorough cultivation permits the essential elements of the air to penetrate to the roots, while the destruction of weeds and insects is essential in preserving both the tree and the vigor of its fruit. To succeed in the culture of flowers and ornamental plants it is quite necessary to construct plant houses, pits, greenhouses, and other structures with the view of securing early development. The art of grafting and propagating plants has led to wholesome results and greater profit. Suitable instruments, tools, and various forms of machinery patented within recent years have facilitated the culture to a great extent. Besides, the operation of railroad lines in various directions has opened a wider market in city and country districts for fruit and ornamental products, making it possible for the inhabitants of the colder regions to enjoy largely the more delicate products grown in the warmer climates.

HOSEA (hō-zē'ȧ), a Hebrew prophet, classed as the first of the minor prophets, who flourished about 750 B. C. He was the son of Beeri, ministering in the reigns of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah. His name does not appear in any book of the Old Testament, except the one which bears his name. In the New Testament he is mentioned by the name Osee.

HOSMER (hŏz'mẽr), **Harriet G.**, sculptoress, born at Watertown, Mass., Oct. 6, 1830. Her early education was obtained at Lenox, Mass. Subsequently she took lessons in modeling at Boston, studied anatomy and dissection in St. Louis, and in 1852 became a pupil of Gibson at Rome, Italy, where she remained two years. Her work in sculpturing takes very high rank. She also attained success in designing machinery and in converting limestone into marble. Among her productions are "Hesper;" "Daphne and Madusa;" "Beatrice Cenci Sleeping in Her Cell;" "Will-o'-the-Wisp;" "Queen of Palmyra;" "Sleeping Fawn," and statues of Thomas H. Benton and Queen Isabella of Spain. She resided in Rome much of the time.

HOSPITAL (hŏs'pĭt-*al*), an institution for the reception, care, and medical treatment of the sick and wounded. The term was applied formerly to a place of hospitality for those in need of shelter and maintenance. This application is still made to institutions built for the care of children, and in some cases to retreats or almshouses for the poor. Hospitals established in modern times are designed for those more or less dependent upon the public, or who are afflicted so as to make it a matter of public policy to extend aid. In many cities hospitals are maintained by appropriations or donations made by private individuals, but more largely by the city, county, or state under a system of general taxation. In these institutions departments or wards are provided, each being in charge of a separate force of attendants, and the whole supervised by a matron, house-surgeon, and apothecary. Patients afflicted with contagious diseases are kept and treated separately. Special departments are provided for those having ailments likely to prove fatal.

During the time of military operations field and naval hospitals are maintained for the care of sick and wounded soldiers and seamen. The hospitals are either temporary or permanent, the former serving immediate wants, while in the latter prolonged cases are treated. Sick or wounded seamen are taken on board of hospital ships, where they are given treatment for a brief period. Later they are transferred to the nearest permanent hospitals, or conveyed to their homes. The care and treatment of sick and wounded military men has made material progress within recent years. It has attracted the attention of philanthropists and of various societies, such as the famous Red Cross.

General hospitals were first established in the 4th century of the Christian era, and since then have spread to all the civilized nations. The United States and the countries of Europe have excellent facilities for the care of unfortunates in hospitals. Some

of the finest institutions provided by the government are maintained for that purpose. The hospitals of New York, Philadelphia, Chicago, St. Louis, and San Francisco are especially noteworthy. The most important of Europe are in London, Berlin, Vienna, Paris, and St. Petersburg. In Europe institutions of this character date largely from the early part of the 16th century.

HOTEL (hō-tĕl′), a large inn or house for the reception and entertainment of strangers or travelers. The hotel buildings of the larger cities are among the finest and best equipped institutions of modern times. There are two general plans of service—the European and American. The European plan is to place a price upon each particular kind of food enumerated on a bill of fare, and extend to the guest the privilege of ordering what he pleases. This practice has been adopted with more or less favor in many of the American cities. The American plan is to serve a general meal without special orders.

HOT SPRINGS, a city in Arkansas, county seat of Garland county, about fifty miles southwest of Little Rock. It is celebrated for its thermal springs, about seventy-five in number, some of which have a temperature of 130° Fahr. There are good public schools, a Roman Catholic convent, and a United States army and naval hospital. The surrounding country is fertile. Railroads, electric lights, waterworks, rapid transit, and sewerage are among the improvements. Population, 1900, 9,973.

HOTTENTOT (hŏt′t'n-tŏt), the descendants of the aborigines of the southern part of Africa. When South Africa was first visited by Europeans, this peculiar race occupied a territory including about 100,000 square miles, from the Cape of Good Hope to the Orange River, but subsequently the number has been reduced greatly. A late census of Cape Colony placed the Hottentot population at 90,000, but these are mixed more or less with other races, the total number of purely Hottentot inhabitants being about 20,000. The name was first applied to them by the Dutch; they call themselves Quaqua. The complexion is light brown, hair wooly, nose flat, nostrils wide, beard scant, and cheek bones high. Though symmetrical in form, their faces are quite ugly, and the general appearance is not pleasant. Formerly the dialect consisted of three classes, but at present they have a language mixed largely with the Dutch and English, and wear European dress.

HOUND, a class of dogs useful in hunting, noted for their ability to locate game by the scent. The best known varieties include the bloodhound, staghound, foxhound, beagle, harrier, and greyhound. In the latter the scent is less acute. Hounds are noted for their docility and attachment to man, and when properly trained are of much service. See **Dog.**

HOUR GLASS, an invention made at Alexandria, Egypt, in the 3d century, and used for measuring time. It consists of two hollow glass bulbs connected by a narrow neck, through which dry sand or some other substance passes. The instrument is not absolutely accurate, as the sand is impeded or affected by the fluctuations of temperature and the humidity contained in the air. Hour glasses are divided into hour glasses proper, and those having a shorter period, as half-hour and three-minute glasses. In the 16th and 17th centuries hour glasses were used as regular pulpit furniture to indicate the length of the sermon, being placed where the congregation could see the grains of sand falling from the upper to the lower bulb.

HOUSATONIC (hōō′sa-tŏn′ĭk), a river of western Massachusetts and Connecticut. It rises in the former state, flows through Connecticut, and after a course of 150 miles discharges into Long Island Sound. It passes through a rich country, affords an abundance of water-power for manufacturing, and is affected by tide-water for fourteen miles.

HOUSTON (hūs′tŏn), a city in Texas, county seat of Harris county, about forty-eight miles northwest of Galveston. It is one of the most important railroad centers of the state, has a growing jobbing trade, and contains numerous factories. The capital invested in manufacturing enterprises is $5,560,000, and 3,250 persons are employed. Among the chief productions are furniture, spirituous beverages, oil, cotton and woolen goods, railroad cars, farming machinery, and packed beef. The cotton-seed oil factories are among the largest in the United States. The surrounding country is agricultural and fruit-producing, and contains deposits of cement-producing minerals. It is the seat of a fine courthouse and other public buildings. Among the facilities are electric street railways, street lighting, sewerage, pavements, good public schools, and many fine churches. Population, 1900, 44,633.

HOUSTON, Samuel, general and president of the republic of Texas, born in Rockbridge county, Virginia, March 2, 1793; died July 25, 1863. His father died when Samuel was a boy, and the latter moved with his mother to Tennessee, where he spent a number of years among the Cherokee Indians. He enlisted in the United States army in 1813, and for bravery in the Creek War was made lieutenant. Shortly after he

SAMUEL HOUSTON

left the army, studied law, and engaged in the practice of that profession in Tennessee. In 1823-27 he served in congress as a democrat, and in the latter year became governor of the state. He married in 1829, but this union proved unfortunate. Shortly after he abandoned his former home and lived for some time among the Indians of Arkansas, whom he represented at Washington as commissioner. In 1832 he visited Texas, and soon after became commander-in-chief of the Texan army in the war against Mexico. His success at San Jacinto over Santa Anna on April 21, 1836, secured the independence of Texas. In 1836 he became the first president of the republic, and was reëlected in 1841. When Texas was admitted into the Union in 1845, he became a United States senator, serving in that position twelve years, and in 1859 was elected governor of the state. His opposition to secession caused his deposition from office in 1861. Houston was a man of commanding presence, fluent oratory, and patriotic devotion to the American Union.

HOWARD (how'ard), **John**, philanthropist, born in Middlesex, England, Sept. 2, 1726; died Jan. 20, 1790. From his father he inherited a fortune, and in 1756 undertook a voyage to Lisbon to study the effects of an earthquake, but was taken captive and consigned to a French prison. His sufferings during confinement led him to devote his attention to the study of prison methods and the reform in their management. After visiting houses of correction in England, Germany, and Russia, he published several works on prisons and hospitals. His self-denial and benevolent work brought about many needed reforms.

HOWARD, Oliver Otis, general, born in Leeds, Maine, Nov. 8, 1830. In 1850 he graduated from Bowdoin College, and in 1854 at West Point, where he became instructor in the military academy. In 1861 he was made colonel, and for gallant services at the battle of Bull Run became brigadier-general. At the battle of Fair Oaks, in 1862, he lost his right arm, but subsequently commanded in the battles of Antietam, Chancellorsville, Gettysburg, and Chattanooga, and accompanied Sherman on his march to the sea. In 1865 he became a commissioner of the Freedmen's Bureau, a position he held until it was closed in 1872. He was chosen president of Howard University in 1869, an institution established at Washington for the education of Negroes. In 1877 he commanded an expedition against the Nez Percés Indians, and detailed information of the campaign in his book, "Chief Joseph." The following year he defeated the Pintes, was promoted major-general in 1886, and retired in 1894. His eldest son, Guy Howard, was killed in action in the Philippines on Oct. 21, 1899. He served against the Indians in 1876 and became captain in 1893. In 1898 he was promoted lieutenant-colonel. He was at the front with General Lawton when slain in battle.

HOWE, Elias, inventor, born in Spencer, Mass., July 9, 1819; died in Brooklyn, New York, Oct. 3, 1867. He developed his invention of the sewing machine while engaged in factories at Lowell and Boston. His first machine was completed in 1845 and patented the following year. Shortly after he sought to introduce his invention in England, but failed, and on returning to Boston found that his patent had been infringed by several manufacturers. After a litigation of seven years, the principal manufacturers were defeated and agreed to pay royalty to Howe. The total fortune derived from his invention amounted to $2,000,000. His successful application of machinery to sewing led to many other similar machines, and completely revolutionized the manufacture of ready-made clothing, mittens, shoes, and harness. In the Civil War he enlisted as a common soldier, and devoted a portion of his wealth to benevolent purposes. Among the marks of distinction bestowed upon him was the cross of the French Legion of Honor.

HOWE, Julia Ward, poetess and authoress, wife of Dr. Samuel C. Howe, born in New York City, May 27, 1819. Her education was liberal, and, after her marriage in 1843, she was associated with her husband in editing the "Commonwealth," a periodical opposed to slavery. Her essays and poems are numerous and contain a vein of deep thought and devoted study. In 1885 she was chief of the woman's department of the New Orleans World's Fair, served a number of years as president of the woman's suffrage movement, and secured a reputation for philanthropic labors. Her publications include "Passion Flowers;" "Modern Society;" "Words for the Hour," and "Life of Margaret Fuller." In 1861 she published her most popular poem, "Battle Hymn of the Republic."

HOWE, Sir William, military officer, born in Plymouth, England, Aug. 10, 1729; died July 12, 1814. He was educated at Eton and joined the army under General Wolfe at Quebec. In 1775 he became commander-in-chief of the British forces in America, succeeding Gen. Thomas Gage, and was superseded by Clinton in 1778. General Howe commanded in the battles of Bunker Hill, Long Island, White Plains, and Brandywine. He was accused of mismanagement, but was acquitted by parliament after an investigation, and in 1779 succeeded to the Irish peerage.

HOWELLS (how'ĕlz), **William Dean**, novelist, born in Martin's Ferry, Ohio, March 1, 1837. He learned the printer's art in the office of his father, became compositor on the "Ohio State Journal" in 1851, and in 1860 wrote "Life of Lincoln," selling the work for $160. In 1861-65 he was consul at Venice, where he published his "Venetian

Life" and later "Italian Journeys." After returning to America, he was engaged on the staffs of the "New York Tribune" and "Times." He also contributed to the "Atlantic Monthly" and "Harper's Monthly," and in 1892 was editor of the "Cosmopolitan." The style of Howells' writings is charming. They are characterized by a pathetic humor and keen observation. His best known works include "Their Wedding Journey;" "Foregone Conclusion;" "Rise of Silas Lapham;" "Modern Italian Poets;" "On the Coast of Bohemia;" "Quality of Mercy;" "Lady of the Aroostook;" "Five O'clock Tea;" "Sleeping-car;" "A Parting and a Meeting," and "Modern Instance."

W. D. HOWELLS.

HOWITT (how'ĭt), **William** and **Mary**, two English writers. The former was born in Heanor, England, in 1795, and, after serving an apprenticeship to a cabinet maker, engaged in the study of literature. In 1823 he married Mary Botham, a lady of literary acquirements. She was born at Uttoxeter, England, March 12, 1799, and, like William, descended from a Quaker family. The two began to contribute to magazines and annuals shortly after their marriage, and also published jointly several productions of much literary merit. Their publications include "Literature and Romances of Northern Europe;" "Book of the Seasons;" "Desolation of Eyam," and "Ruined Abbey of Great Britain." In 1840 they removed to Heidelberg, Germany, where Mary translated Hans Andersen's works into English. While there William wrote "Aristocracy of England" and "Homes and Haunts of the British Poets." Subsequently they settled in Rome, Italy, where both died, William on March 3, 1879, and Mary on Jan. 30, 1888.

HOWRAH (how'rä), an important city of India, on the Hugli River, opposite Calcutta, with which it is connected by a floating bridge. There are several fine buildings, including churches, temples, schools, hospitals, and government structures. It has good railroad and electric railway connections. The manufactures include fabrics, furniture, machinery, utensils, and toys. Population, 130,100.

HUBER (hoo'ber), **Francois**, celebrated naturalist, born in Geneva, Switzerland, July 2, 1750; died in Lausanne, Dec. 21, 1831. Over-study at an early age caused him to suffer with an affection of the eyes, which later resulted in total blindness. His wife, Marie Lullin, assisted him, and ministered to his wants with unceasing devotion. He was thereby enabled to publish several valuable treatises on natural science, among them "Habits of Ants" and "New Observations on Bees." The latter appeared in 1792. It has gone through many editions and translations, and laid the foundation of scientific knowledge of bee-culture.

HUCKLEBERRY, or **Whortleberry**, a small shrub native to the northern part of America and Eurasia, and known by its bell-shaped flowers and berries with many seeds. It is found in the dry soil of woods and mountain sides and has dark purple berries, which are used in preserves. Species called bilberry grow in moist and marshy places, but their fruit is less serviceable, owing to greater tartness. Most varieties attain a height of from one to two feet.

HUDDERSFIELD (hŭd'erz-fēld), an important city in the West Riding of Yorkshire, England, noted for its manufactures of steam engines and machinery. It also produces cotton, woolen and silk goods, and utensils. The city has several splendid churches, extensive railroad connections, and several lines of electric railways. There are waterworks, pavements, several parks, and a fine public library. It is the seat of Huddersfield College. Population, 100,135.

HUDSON, county seat of Columbia county, New York, on the Hudson River, twenty-eight miles below Albany. It is the focus of several railroads and has a growing trade in merchandise. There is an extensive school system. It has a number of libraries. The manufactures include steam engines, car wheels, pianos, carriages, cotton and woolen goods, and farming implements. It is surrounded by an agricultural and dairying country. There are street railways, electric lights, pavements, waterworks, and good county buildings. Population, 1900, 9,528.

HUDSON, Henry, distinguished navigator, born in the latter part of the 16th century, but whose history prior to 1607 is unknown. In that year he made an expedition to find a northeast passage to China. He made a second voyage in 1618, explored the coast of Greenland, and suggested for the first time the existence of an open polar sea. In 1609 he sailed in the employ of the Dutch East India Company, under whose direction he cruised along the coast of Labrador, discovered the Hudson River, which was named after him, and sailed about 150 miles up the river. His last voyage was made in 1610, when he discovered Hudson Strait and Bay, and explored a portion of their coasts. Owing to a scarcity of provisions, his sailors mutinied and set Hudson, his son John, and seven of the most infirm adrift in a small boat. They were never heard from again, but the survivors reached England after much suffering. Hudson published "Divers Voyages and Northern Discoveries" and "A Second Voyage."

HUDSON BAY, a large bay, or inland sea, situated in the northeastern part of North America. Its length is about 1,000 miles; breadth, 600 miles, and area, 500,000 square miles. It is inclosed wholly by British territory, communicates with the sea through Fox Channel and Hudson Strait, and receives the drainage of a large portion of Canada. Numerous reefs and islands abound along the western shore. In the southern portion is James Bay. The streams flowing into it include the Great Whale, Big, East, Albany, Nelson, Fish, Seal, and Severn rivers. It is open to navigation about five months in the summer; the other seasons of the year its surface is covered with ice or largely obstructed by drift ice. Several harbors are situated in the southern part, where also the adjoining regions are adapted to stock raising and farming. The fur trade and white whale fisheries are especially profitable, but considerable quantities of fish are also secured in the summer season.

HUDSON BAY COMPANY, a corporation chartered by Charles II. of England in 1670, in which Prince Rupert and other noblemen were interested. The company secured sole control of the large region known as Rupert Land, consisting of all that portion of Canada which drains into Hudson Bay. The object was to control the fur and skin trade. Later the company secured control for a like purpose of possessions extending to the Pacific, but in 1870 its rights were transferred largely to the crown in consideration of $1,500,000. However, the company reserved rights to certain ports, about 50,000 acres of land, and exclusive control of the chase in certain regions. It has still a large trade in furs and in the sale of its lands to speculators and settlers.

HUDSON RIVER, an important river of New York, rises by two small streams in the Adirondack Mountains, at a height of 4,325 feet above sea-level. Its course is almost due south, and about 340 miles long. It flows into the Bay of New York. The Hudson is navigable a distance of 145 miles, to Albany, for the largest vessels. There are beautiful falls of fifty feet at Glens Falls. Its course is through regions both historical and beautiful. It was named from its discoverer, Henry Hudson. Upon it sailed the first steamboat made by Fulton. A tunnel under it connects Jersey City and New York, and it is spanned by many valuable bridges. About fifty miles north of New York is the West Point Military Academy, near which the historic treason of Arnold took place. The upper Hudson is noted for its precipitous banks and picturesque scenery.

HUE (hōō-ā′), a city on the Hue River, in Anam, Asia, capital of that country, and noted for its importance as a military and trade center. The French fortified it in 1801, to whom it is subject. It contains a garrison of troops and several public buildings, but the houses of the natives are inferior. The population is 30,000, but with several suburbs and the garrison includes 50,500.

HUE AND CRY, a phrase that originated with the Anglo-Saxons from the manner in which criminals were apprehended. If the offender could not be found, the hue and cry was raised, and all the people joined in the search until the offender was seized. For many years all persons informed of a criminal offense were by law required to raise the hue and cry, but it was abolished many years ago.

HUGHES (hūz), **Thomas**, author, born in Uffington, England, Oct. 20, 1823; died in Brighton, March 22, 1895. He studied at Rugby and Oxford, was admitted to the bar in 1848, and became queen's counsel in 1869. From 1865 to 1874 he was a member of parliament, at which time he became identified with social and sanitary reforms among the poor of London, supported the Christian Socialists, and was prominent as a leader in advocating trades unions. In 1856 he published "Tom Brown's School-days," a well-known work, and one that presents a truthful picture of life at Rugby. Other publications include "Tom Brown at Oxford;" "The Scouring of the White Horse," and "Life of Alfred the Great." Later he edited Lowell's "Biglow Papers." He assisted in founding a coöperative colony in the United States, which he described in a publication entitled "Rugby, Tennessee."

HUGO (ü-go′), **Victor Marie**, noted poet, born in Besancon, France, Feb. 26, 1802; died in Paris, May 22, 1885. His father was a general under Napoleon, and, in accord with the teachings of his mother, young Hugo became a devoted Bourbonist. He studied at Paris and Madrid, his father holding an important position in the latter city while Joseph Bonaparte was king of Spain. He began writing tragedies and poems at an early age, and in 1822 published his "Odes and Ballads." In the French Academy he secured several prizes, and also attained a high standing at the floral games at Toulouse. His mother died about the time he came into public notice, and at his marriage soon after Louis XVIII. brightened his prospects by a liberal pension. In 1841 he was elected to the French Academy, was made a peer of France under appointment of Louis Philippe, and in 1848 became devoted to democratic tendencies in politics.

VICTOR HUGO.

Victor Hugo opposed Louis Napoleon in his ambitions, and in 1852 published his

memorable philippic, "Napoleon le Petit," against him. Soon after he was banished, when he sought a refuge in Brussels, but finally settled in Jersey and the neighboring island of Guernsey, where he produced a number of interesting productions against Napoleon. While there he wrote most of the works which have made his name famous. The writings of Hugo occupy a high position in the literature of France, and, for that matter, of the world. They have gone through many translations and editions. He was the foremost man of letters of his time, and gave to literature some of the most exquisite gems. He ranks highest as a poet, though his novels and dramas show much genius, and all will live on through the ages. Among his best known works are "Les Misérables;" "Notre Dame of Paris;" "Marie Tudor;" "The Man Who Laughs;" "Speeches and Addresses;" "Meditations;" "Les Orientales;" the drama, "Hernani;" "Marion Delorme," and "Letters of Victor Hugo," edited by Paul Maurice.

HUGUENOTS (hū'gĕ-nŏts), a term probably originated from Hugues, an obscure religious advocate, and applied to the Protestants of France during the Reformation and in the religious struggles of the 16th and 17th centuries. Among the early Protestants of France were Farel and Margaret of Valois, sister of Francis I. and queen of Navarre. The movement was opposed by Francis I., but, when Henry II. of Germany joined the Protestant party and gave it encouragement in 1547-59, the Reformation made powerful advances in both France and Germany. In the reign of Francis II. it was headed by the Bourbon family, and supported with vigor by the queen of Navarre and the prince of Condé. The Guises led the Catholic party. Under their leadership a fanatical persecution of Protestants was pursued, many being executed or banished and their property confiscated. The events rapidly formed under which the Protestants took up arms. They named Louis I., the prince of Bourbon-Condé, as their leader, and at a meeting in Nantes, on Feb. 1, 1560, resolved to petition the king for the removal of the Guises and the freedom of religion. It was also agreed that, if the petition be ignored, the king should be seized and Condé proclaimed regent of the realm. Shortly after the king was informed of the intention and fled to Amboise, and 1,200 Protestants were made prisoners and executed.

After the death of Francis, in 1560, it became necessary for Charles IX. and his mother, Catharine de Médici, to curb the power of the Guises by encouraging the Protestants. Accordingly, the Guises were removed, an edict freeing the Huguenots from penalty of death was issued, and in 1562 they received the freedom of religious worship on their own estates. An attack made by adherents of the duke of Guise on a Protestant meeting, in 1562, brought about a prolonged series of religious wars, by which France suffered great losses in life and property for many years. The Protestants were defeated at Dreux by the duke of Guise, but he was assassinated on Feb. 18, 1563, while marching upon Condé at Orleans. The peace of Amboise, concluded by Catharine, granted freedom of religion in many portions of France, but an alliance with Spain caused a renewal of hostilities and the execution of about 3,000 Huguenots. Condé was killed in battle at Jarnac on March 3, 1569, and shortly after Catharine began to plan the suppression of Protestants by a general massacre. This scheme was inaugurated in 1572 by the Massacre of St. Bartholomew, and within a few months about 30,000 Protestants were slain in France. The Protestants fled for protection to their fortified towns and carried on a defensive war with varying success until 1580, when peace was concluded.

In 1584 Henry of Navarre became heir to the throne on account of the death of the duke of Anjou, but the duke of Guise laid claim to the throne of France. He revived the Holy League, formed an alliance with the pope and Spain to exterminate heresy, and inaugurated the so-called "War of the Three Henries." The Protestants secured troops from Germany and some from England, and under the leadership of Henry of Navarre presented a formidable opposition. In this conflict the duke of Guise, Cardinal Lorraine, and the king of France were assassinated, and Henry of Navarre ascended the throne. On April 13, 1598, the famous Edict of Nantes was issued, by which the Protestants were given freedom of worship. Previous to this, in 1593, Henry of Navarre went over to the Catholic party for the purpose of maintaining himself on the throne.

The Protestant influence continued to develop, and successive hostilities occurred in 1615, 1622, and from 1624 to 1629, when a war was waged against the Protestants by Richelieu, which ended in the latter year by the capture of the Huguenot stronghold, La Rochelle. However, the Protestants still continued to enjoy freedom of conscience under the ministry of Richelieu and Mazarin, but they were required to surrender their strongholds. Later Louis XIV. and Madame de Maintenon inaugurated a new series of persecutions, which caused many thousands to seek refuge in Germany, Switzerland, Holland, and England. Those remaining were guarded by dragoons or compelled to abjure their faith. Louis revoked the Edict of Nantes on Oct. 23, 1685, which was followed by horrible persecutions and the industry of thousands of Huguenots was carried to foreign countries. These persecutions included the annulling of marriages; ruthless murder of women and children; the execution of preachers, and the closing

of convents. Louis XV. issued an edict of suppression, though this was revoked under general opposition. The Protestants attained equality only with the Revolution of 1789, when they secured a recognition of their political and civil rights.

The first Huguenots came to the American colonies in 1630, when they were induced to settle in the Carolinas under the charter granted to Sir Robert Heath, and large numbers also settled in Virginia. When the Edict of Nantes was revoked, their immigration reached its height, and large parties also came to Virginia in 1700. In South Carolina they founded a settlement at Charleston, and also made settlements in the middle states, particularly in New York. The industry of the Huguenots added greatly to the early development of the colonies, since they possessed superior skill, thrift, and energy. Besides engaging in agriculture, they introduced dyeing, the manufacture of woolen goods, and glass-making.

HULL, a Canadian city, in Ottawa county, Quebec, on an island in the Ottawa River, opposite Ottawa city. It has manufactures of furniture, axes, paper, matches, woolen goods, and machinery. There are modern municipal facilities, good educational institutions, and extensive railroad connections. Productive iron, phosphate, and mica mines are in its vicinity. Population, 13,993.

HULL, a river-port of England, in the East Riding of York, on the north bank of the estuary of the Humber, where it is joined by the Hull. It is noted for its spacious docks and an extensive trade. There are many modern improvements, such as gas and electric lights, street railways, and excellent public parks. The manufactures embrace shipbuilding, flax and cotton goods, oil, cordage, machinery, and utensils. It is noted as a commercial and educational center, has a fine public school system, and is the seat of several large churches, a public library, and Hull College. The city was chartered by Edward I. in 1299. In the civil war it was held by the parliamentary forces, and successfully repulsed the royalists at two different sieges. Population, 241,827.

HULL, Isaac, naval officer, born in Derby, Conn., March 29, 1773; died in Philadelphia, Penn., Feb. 13, 1843. He was a nephew of William Hull, became lieutenant in 1798, and served with credit in the West Indies and in the Mediterranean. In 1806 he became captain and commanded the Constitution in the War of 1812, when occurred the famous encounter with the Guerriere, in which the latter was defeated. After this victory the Constitution became noted as Old Ironsides. Hull was granted a gold medal by congress. Subsequently he commanded a squadron in the Pacific and in the Mediterranean, and retired in 1841.

HULL, William, general, born in Derby, Conn., June 24, 1753; died in Newton, Mass., Nov. 29, 1825. In 1775 he was admitted to the bar, joined the American army at Cambridge, and fought as captain at White Plains, Trenton, and Princeton, and was promoted to the rank of major. Later he fought with distinction in various battles, and after the close of the war practiced law at Newton. He served several years in the legislature of Massachusetts. In 1805 he became governor of Michigan territory, serving till 1812. He commanded the northwestern army in the War of 1812, and with a force of 1,500 men defended Detroit. He regarded himself compelled to surrender to the British, and yielded without making material resistance. For this he was tried by court-martial and sentenced to be shot, but President Madison pardoned him on account of previous service. He published "Campaign of the Northwestern Army," a work that appeared in 1824.

HUMBERT I., Emmanuel Engene, king of Italy, eldest son of Victor Emmanuel II., born March 14, 1844; assassinated July 29, 1900. In the war of Italian independence, in 1859, he accompanied his father, and rendered assistance in uniting the Italian states. He took the field against Austria in 1866, and was present at the battle of Custozza. In 1868 he married his cousin, Princess Marguerite of Savoy, and on the death of his father, Jan. 9, 1878, succeeded to the throne of Italy. An attempt to assassinate him the first year of his reign failed, and he commuted the death sentence of the assassin to life imprisonment at hard labor He exposed himself frequently by endeavoring to relieve the sufferings of the sick and dying during the cholera epidemic at Naples, and by these and other acts of kindness won the affection of his people. His administration was eminently successful. Within the period of his reign educational and industrial arts were encouraged. On July 29, 1900, while returning from a review of educational exercises, he was assassinated by an Italian who went from Paterson, New Jersey, for that purpose. His early death was greatly mourned by his subjects. He was succeeded on the throne by his son, Victor Emmanuel III., who was born in Naples, Nov. 11, 1869.

VICTOR EMMANUEL III.

HUMBOLDT (hŭm'bōlt), an inland river of Nevada, rises by two forks in Elko county, and after a course of 390 miles flows into Humboldt Lake, an inland body of water in the western part of that state, about 4,000

feet above sea-level. The Humboldt River is remarkable because its water contains a large per cent. of soda. It flows through a valley, and is followed from its source to its mouth by the Central Pacific railroad.

HUMBOLDT, Friedrich Heinrich Alexander, Baron von, celebrated naturalist, born in Berlin, Germany, Sept. 14, 1769; died May 6, 1859. His father was an official to the king of Prussia, and died when young Humboldt was about ten years of age. He pursued courses of study in Frankfort, Berlin, and Göttingen, and also studied at the Commercial Academy in Hamburg. At Freiberg he studied mining and botany in 1791, and soon after was appointed overseer of a mine in Franconia. A scientific tour along the Rhine, which included visits to France, Belgium, Holland, and Switzerland, led to many useful discoveries, and in 1797 he resolved to make a scientific journey to the tropical zone. He sailed with Aimé Bonpland, who became his associate, in June, 1799, and the following month landed at Cumana, South America. He spent five years exploring the regions now included with Ecuador, Peru, Colombia, and Venezuela, cruised on the Orinoco and other rivers, and also visited the West Indies and Mexico. In 1804 he returned to Europe, taking with him many specimens in botany, zoology, geology, and geography, together with copious notes in these branches, and also in political economy and ethnology. About twenty years were spent in preparing his great work upon the researches made in America, a publication entitled "Voyages to the Equinoxial Regions of the New Continent." While preparing this work he resided in Paris, but in 1837 settled in Berlin, where he received high recognition by the government of Prussia.

BARON HUMBOLDT.

In 1829 Humboldt made an expedition to Central Asia and Siberia under Czar Nicholas, in which he explored the Ural and Altai mountains, the Caspian Sea, Chinese Dzungaria, and other points of interest. These explorations resulted in his publication, "Central Asia." Subsequently he entered the diplomatic service of Prussia, holding positions at Paris, London, Copenhagen, and other European courts. The works of Humboldt distinguish him as one of the most celebrated naturalists of the 19th century. His works are authoritative and have been translated into many modern languages. The researches made by him cover important phases of geography, electricity, meteorology, climatology, magnetism, and various departments of zoology and botany, such as the hibernation of crocodiles, breathing of fishes, and growth of tropical plants. Among the important publications not named above are "On the Irritability of the Muscular and Nervous Fibers;" "Views of Nature;" "Geology and Climate of Asia;" "Mineralogical Observations of Basalt," and "Cosmos."

HUMBOLDT, Karl Wilhelm von, author and statesman, eldest brother of the preceding, born in Potsdam, Germany, June 22, 1767; died April 8, 1835. He studied in Berlin, Frankfort, and Göttingen, traveled extensively in France, Spain, and Switzerland, and attained to the rank of counselor of legation. In 1791 he married and settled at Jena, where he became associated with Schiller, and also exercised a marked influence in the educational affairs of Prussia. He was appointed Prussian minister to Rome in 1801, where he became a generous patron of artists and men of science. After returning to his native country, he became minister of public instruction, and was instrumental in founding the University of Berlin. In 1810 he was appointed ambassador to Austria, was influential in concluding the peace of Paris in 1814, and took a prominent part in the congress of Vienna in 1815. He retired from active politics in 1819 and settled at Tegel, where he platted fine gardens, collected works of art by the master artists, and devoted himself to literature. His knowledge of modern and ancient languages was extensive, and he also possessed a fluency in the Basque tongue, several languages of the Orient, and those of the South Sea islands. His writings include "Æsthetic Essays;" "On the Kawi Language of Java;" "Original Inhabitants of Spain in Connection with the Basque Language;" "Diversity of Language and Its Influence on the Diversity of Speech;" "Additions and Corrections to Adelung's Mithridates," and "Letters to a Lady Friend."

HUME (hūm), **David,** philosopher and historian, born in Edinburgh, Scotland, April 26, 1711; died Aug. 25, 1776. Being the youngest son of the proprietor of an estate in Berwickshire, he was obliged to attain to fortune without assistance from home, except an education. His father sent him to the college of Edinburgh for the study of law, but he soon became imbued with a desire to study literature and philosophy. In 1734 he retired to France, where he spent a number of years in studious work on his "Treatise on Human Nature," a work of much merit published at London in 1739. This publication attracted little attention, compelling Hume to seek a livelihood in some other way, and he shortly after engaged as companion to an insane nobleman, marquis of Annandale. In 1747 he became secretary to General Sinclair and accompa-

nied him in an expedition against France, but finally became military ambassador at Vienna and Turin. In the meantime he devoted much of his time to various works on philosophy and history, and in 1752 was made librarian of the Advocates' Library in Edinburgh, when he began to write his "History of England." The first volume of this work appeared in 1754. It covers the reigns of James I. and Charles I. Later he carried it back to the Norman conquest and added notes to his former work. While not a careful history of facts, the work remained a standard for many years and portions are still in public favor. In 1763 he became secretary to the ambassador to Paris, the earl of Hertford, and was received in the literary circles of France with much enthusiasm. While there he became associated with Diderot, Rousseau, D'Alembert, and Buffon, and returned to England in 1766, accompanied by Rousseau. In 1767 he was chosen under-secretary of state, but retired the same year to Edinburgh. Hume ranks as a writer of acute intellect and is distinguished for his marked ability in negative criticism. His writings embrace "Inquiry into the Principles of Morals;" "Political Discourses;" "Dialogues Concerning Natural Religion;" "Inquiry Concerning the Human Understanding," and "Essays: Moral, Political, and Literary."

HUMMING-BIRD, the name applied to a family of small birds, so named from the sound made by their wings in flight. They

HUMMING-BIRDS.

are native only to America and the West Indies, and are more abundant in the tropical than in the temperate regions. Most varieties are very small, some not larger than a bumblebee, but all are noted for their beauty of color and plumage, their quickness in darting through the air, and the peculiar manner in which they gather the food from flowers and foliage. In taking food they never alight, but feed while hovering on the wing before a flower, supporting themselves by vibratory movement of the wings, thus producing a peculiar humming sound. Most varieties have a long, slender beak, either curved or straight, and a tongue which they are capable of protruding some distance in securing food. Their food consists partly of the nectar found in flowers, but they also feed on insects, and carry away flies caught in the webs of spiders. The female lays two eggs in a nest built of vegetable fibers or cotton. Both sexes display much boldness in defending their young, and with much vigor strike their enemies, usually aiming to inflict a wound in the eyes. There are no less than 400 species of humming-birds, some of which are migratory and are seen far in the north of the temperate zone. The tufted-necked humming-bird of northern Brazil is the most remarkable species of these birds, and is noted for its variety of color and beautiful plumage. The only sound given out by humming-birds is a chirp, with a vigor equal to that of a cricket. Their flight is so rapid as to elude the eye. The larger species are about the size of a wren.

HUMPHREYS (hŭm'frĭz), **Andrew Atkinson**, soldier and engineer, born in Philadelphia, Penn., Nov. 2, 1810; died in Washington, D. C., Dec. 27, 1883. He graduated at West Point in 1831, became lieutenant of topographical engineers in 1838, and in the Civil War became major-general of volunteers. He served at the battles of Fredericksburg, Chancellorsville, and Gettysburg, and was in command of a corps at the siege of Petersburg. In 1866 he was appointed chief of engineers of the United States, with the rank of brigadier-general, and retired from active service in 1879.

HUNGARY (hŭn'gȧ-rĭ), an important political division of Europe, forming the eastern part of the monarchy of Austria-Hungary. It has an area of 125,839 square miles, with a population of 19,750,840, and comprises, besides Hungary proper, Croatia, Slavonia, and Transylvania. The surface is well adapted to agriculture, which is the principal industry. It may be regarded a natural basin around which extend mountain chains, except on the south, where the valley of the Danube stretches into Servia. The Theiss, Danube, and Drave, with their tributaries, form the drainage, practically all of which is by the Danube into the Black Sea. Two lakes, the Balaton Lake and the Neusiedler Sea, are situated between the Drave and Danube, and form the principal lake basins, though during dry seasons the water is evaporated.

The productions, climate, and general industries of Hungary are practically the same as those described in the article treating Austria. However, it may be helpful to the student to add in addition that Hungary is exceedingly rich in minerals, forests, soil products, and internal improvements. The canals and navigable rivers have a length of 3,150 miles, while railroad lines penetrate all portions of the country, the different lines

including about 12,500 miles. Among the minerals are iron, lead, copper, cobalt, salt, gold, silver, coal, petroleum, zinc, antimony, and peat. The soil products consist of wheat, cotton, tobacco, hay, barley, rye, a large variety of fruits, and many valuable forest products. Stock-raising, dairying, and manufacturing are also of growing importance. About thirty-five per cent. of the population are illiterate, but schools and colleges have been established under government grants, and school attendance is compulsory. The religious affiliations are diversified greatly, as also are the races represented in the various portions. Among the numerically strongest sects are Roman Catholic, Lutheran, Calvinist, Greek Catholic, Arminian, Unitarian, and Israelite. All forms of worship are entirely free, and marked liberalism is shown in the treatment of all classes. The races most numerous are Hungarians, Germans, Servians, Croatians, Bohemians, Moravians, Slovaks, and Jews. However, the Hungarians constitute about one-half of the inhabitants.

The Hungarians or Magyars are an Asiatic people of the Turanian race, and are allied to the Finns and Turks. Formerly they occupied regions in southern Russia adjacent to the Caspian Sea, but under their leader, Arpad, they crossed the Carpathians in 889 and occupied the plain of the Danube. Subsequently they conquered the regions now occupied by Transylvania and Hungary, and also made incursions into Germany and France. Otho I. of Germany defeated them with great slaughter, after which they became less warlike and developed agriculture and civilized arts. They formed a kingdom in the latter part of the 10th century, and in 997 Steven I. became their king, ruling till 1030. During his time the Hungarians embraced Christianity, established churches, founded cities, developed the arts of peace, and laid the foundation for their present power. Steven was made a saint by Pope Sylvester II., and given the title of Apostolic King. During the reign of succeeding kings the boundary line was extended; Croatia and Slavonia were added in 1089 by King Ladislaus, and Dalmatia in 1102 by King Coloman.

In 1222 the nobles secured from Andrew II. the Golden Bull, the so-called Magna Charta of Hungary, by which civil rights were defined. Andrew III. was the last of the house of Arpad, died in 1301, and was succeeded by Charles Robert of Anjou in 1309. During his reign Hungary became one of the greatest military powers of Central Europe. In 1342 Louis I. became king, and in his reign of forty years annexed Red Russia, Moldavia, Poland, and a part of Servia. Sigismund, who ascended the throne in 1387, was elected emperor of Germany. His reign became famous for the wars with the Turks and the Hussites. He also established an academy at Buda and secured various reforms. Matthias Corvinus became king in 1458, founded a university at Pressburg, defended the country against the Turks, and added territory to his dominion. The next sovereign of note was Ladislaus II., who reigned from 1490 to 1516, and was succeeded by Louis II., reigning till 1526. While they occupied the throne the country was disturbed by domestic troubles and incursions of the Turks. At Mohacs the Hungarian army was defeated by Soliman the Great, and 30,000 people were carried into slavery. A large portion of the Hungarian provinces remained under Turkish dominion for 160 years. Ferdinand of Austria, a brother-in-law of Louis II., subsequent to the death of the latter entered upon a conquest of Hungary. After a dispute between him and John Zapolya, of Transylvania, the Protestants sided with Ferdinand and the house of Hapsburg obtained control of Hungary, a connection still existing.

An effort to secure the independence of Hungary was made by Leopold I. in 1686, in which most of Hungary and Transylvania was recovered and Vienna threatened, but by the assistance of John Sobieski, king of Poland, the Hapsburgs retained control. The dynasty was again saved from ruin in 1724 through Charles VI. by a recognition of the female line, under which Maria Theresa eventually became ruler. Both Germany and France disputed her claim, but the invaders were repelled by the Hungarians. The queen showed her gratitude by granting religious freedom, building schools, and encouraging agriculture. Joseph II., son of Maria Theresa, governed Hungary without regard for its constitution, but, when Francis I. succeeded him, the Hungarians gave the latter valuable support in money and troops to defend the Hungarian constitution against the claims of Napoleon. Later he imposed exorbitant taxes, but in 1825 a diet was summoned to devise reforms, which also discontinued the Latin language in public debates and adopted the Magyar. The diets of 1830 and 1832 again raised questions regarding absolute religious views, popular suffrage, and the rights of the common people, in which such men as Francis Deak and Louis Kossuth were prominent factors. These patriots were first imprisoned, but, when the French Revolution of 1848 gained strength, it also gave an impulse to the demands for greater rights and equality to the people of Hungary, and soon after formal concessions were granted by the court of Vienna.

Kossuth published the first Hungarian daily newspaper and spread the doctrine of human rights broadcast in the land, advocating equal taxes for all, freedom of speech and the press, and equality in citizenship. The government began to operate secretly against these demands, but the Austrians, who were also clamoring for reforms, encouraged a revolt of the Croats and Wal-

lachians, inducing them to invade Hungary. An Austrian army sought to suppress the revolution, but after a number of battles the successes were on the side of the Hungarians, and Austria was obliged to enlist aid from the Russians. After struggling for som time, the heroic Hungarians were obliged to surrender, and many of the most patriotic statesmen and soldiers were executed. The battle of Sadowa, in 1866, brought about a separation between Austria and Germany, and the demands of Hungary were now heeded by the granting of a constitution. In 1867 Francis Joseph was crowned king of Hungary with a splendid public ceremony. Since then the government has been a constitutional monarchy. Hungary has its own parliament for local government and sends its share of delegates to the national assembly, a form of home rule long contended for by Ireland. Buda-Pest is the capital. It is a beautiful city of thrift and enterprise. Other important cities include Szegedin, Marie Theresiopel, Pressburg, Debreczin, and Temesvar.

HUNS, a Turanian race of nomadic and warlike people, who, prior to the Christian era, were confined to Asia. They had a yellow complexion, low and strong structure, flat nose, and eyes deeply sunken in the head. To prevent the growth of the beard they scarred their faces with lashes and consequently possessed a peculiar ugliness. In habits they were roving, built no houses or cities, clad themselves in skins, and were noted for excellent horsemanship. Their families and all their possessions were carried in huge wagons, and their means of subsistence was secured largely from the chase and rude agriculture.

The Huns organized a powerful state in Mongolia. In the year 200 B. C. they overran the Chinese Empire, and after consecutive defeats compelled the Chinese emperor, Kao-ti, to make a treaty. In the reign of Vou-ti, about the year 80 B. C., they were defeated by the Chinese, and subsequently large waves of emigration began to move westward in search of possessions in the vicinity of the Caspian Sea. They settled between the Ural and Volga rivers. About 372 A. D. large numbers crossed the Volga, conquered the Alani, then the Ostrogoths, and caused the Visigoths to emigrate and settle west and south of the Danube. Successive waves of immigration appeared, by which the former possessions of the Goths became a stronghold of the Huns, and their powerful chief, Rugias, in 432, secured from Theodosius II., emperor of Byzantium, valuable tributes and territorial possessions.

Their greatest warrior was Attila, who called himself the scourge of God. He gathered a half-million savages, with whom he moved westward from his wooden palace in Hungary, and vowed that he would not stop until he reached the sea. The army of Theodosius was beaten in three battles, and Macedonia, Thrace, and Greece were completely overrun by the Huns. Subsequently Attila led a campaign against the Germans on the Rhine, and proceeded into France. On the field of Chalons, in 451, the Huns were defeated by Aëtius, the Roman general in Gaul, and Theodoric, king of the Goths, and Europe was saved to Christianity and Aryan civilization. Attila next crossed the Alps and descended into Italy, where city after city was taken. While marching upon the city of Rome, he was met by Pope Leo I., and by his majestic mien and exemplary character inspired Attila to spare the city. The death of Attila and the defeat at Chalons were heavy blows against the Huns. Later they were defeated in successive battles by the Goths and other Germanic tribes. This not only scattered their forces, but required them to remain largely on the east side of the Danube.

HUNT, Helen. See **Jackson, Helen Maria.**

HUNT, James Henry Leigh, poet and essayist, born in London, England, Oct. 19, 1784; died in Highgate, Aug. 28, 1859. He studied at Christ's Hospital, London, took a course of reading in a law office, and for four years held a position in the war office. In 1809 he formed a partnership with his brother John to found the "Examiner," a newspaper devoted to liberalism in politics. A libel suit was instituted against him for calling the prince regent a "corpulent Adonis of fifty," and in 1813 he was sentenced to a fine of $2,500 and imprisonment at Surrey jail for two years. While in confinement he remained busy, and also received visits from such distinguished men as Byron, Keats, and Shelley. After his release he again settled in London, and there busied himself in literary work. His poems and essays are among the best, being characterized by the cheerful and fanciful. An extended visit to Italy was fruitful in that it brought many new thoughts and literary touches into English productions, all of which he twined gracefully with the brighter side of life. His best known works include "Lord Byron and His Contemporaries;" "Imagination and Fancy;" "Stories of the Italian Poets;" "Religion of the Heart;" "Men, Women and Books;" "Old Court Suburb;" "Story of Rimini;" "Table Talk," and "Wit and Humor." He also wrote the lives of Congreve and Farquhar, and sketches of Shelley and Keats. Parliament granted him a pension of $1,000.

HUNT, William Holman, painter, born in London, England, in April, 1827. He studied at the Royal Academy, and in 1846 was admitted to its membership. In 1848 he became associated with Dante Gabriel Rossetti. The two were joined by several other young painters in establishing the Pre-Raphaelite Brotherhood, a movement designed to avoid vivid and excessive imaginative treatment of subjects, aiming to secure

greater trueness to nature. He visited Palestine in 1854 for the purpose of studying life in the East, and while there secured a series of pictures illustrating incidents in Bible history, which he touched with the finer scenery of the Holy Land. In 1876 a number of his productions were exhibited at the Centennial Exposition, where they attracted general attention. Hunt produced many exquisite works of art; a number of them are masterpieces. They include "Flight of Madeline and Porphyro;" "Rienzi Vowing to Avenge the Death of His Brother;" "Light of the World;" "Awakened Conscience;" "Scapegoat;" "Triumph of the Innocents;" "Finding of the Saviour in the Temple;" "Flight into Egypt;" "Dante Gabriel Rossetti," and "Isabella and the Pot of Basil."

HUNTER, David, soldier, born in Washington, D. C., July 21, 1802; died there Feb. 2, 1886. In 1822 he graduated at West Point, became captain of dragoons in 1833, and twice crossed the Rocky Mountains while on frontier duty. In the Mexican War he was paymaster in the command of General Wood, and in 1861 accompanied Lincoln while proceeding to Washington to be inaugurated. Shortly after he entered the Union army, commanded a division at Bull Run, and the following year became major-general of volunteers. About this time he organized a volunteer regiment of fugitive slaves, one of the first black troops in the national service, which induced Jefferson Davis to proclaim him an outlaw. In 1864 he commanded the department of West Virginia, defeated the Confederates at Piedmont, and subsequently served on the commission which tried the conspirators implicated in the assassination of Lincoln. He retired from active service in 1866.

HUNTINGDON (hŭn'ting-dŏn), county seat of Huntingdon county, Pennsylvania, on the Juniata River, and conveniently connected by several railroads. The surrounding country has extensive deposits of iron, lead, coal, and building stone, and also has valuable timber. Among the manufactures are railroad cars, flour, ironware, cigars, and machinery. It has a fine county courthouse. Besides its public school system, it contains a normal college, and is the seat of the State Industrial Reformatory. Population, 1900, 6,053.

HUNTINGTON, a city in Indiana, county seat of Huntington county, on the Little River, twenty-five miles southwest of Fort Wayne. The surrounding country is agricultural and produces the famous Huntington white lime. The general facilities include waterworks, electric railways and lights, and good public schools. Among the manufactures are woolen goods, cigars, flour, shoes, bicycles, stoves, and ironware. It is the seat of important railroad shops. Extensive railroad connections give Huntington excellent shipping facilities. Population, 1900, 9,491.

HUNTINGTON, an important city of West Virginia, in Cabell county, on the Ohio River, forty-six miles west of Charleston. It is noted as an important railroad and jobbing center. The surrounding country is fertile. It also produces large quantities of iron, coal, salt, fruits, and lumber products. The manufacturing establishments include woolen and flouring mills, car and broom factories, iron works, and tobacco factories. It has a fine public school system, is the seat of a state normal school, and of Marshall College. Electric street railways, pavements, public lighting, and waterworks are among the municipal facilities. Population, 1900, 11,923.

HUNTINGTON, Daniel, painter, born in New York, Oct. 14, 1816. He studied at the National Academy of Design under Prof. S. F. B. Morse, and in 1839 at Florence, Italy, where he produced a number of excellent pictures. He visited Europe in 1851 and again in 1882, and served as president of the National Academy most of the time from 1862 to 1891. His portraits include those of Presidents Van Buren and Lincoln, William Cullen Bryant, and Louis Agassiz. Other noted productions are "Bar-Room Politician;" "Florentine Girl," and "Queen Mary Signing the Death Warrant of Lady Jane Grey."

HUNTINGTON, Frederick Dan, theologian, born in Hadley, Mass., May 28, 1819. In 1839 he graduated at Amherst College, studied at Cambridge Divinity School, and became a Unitarian pastor at Boston. In 1855 he was made professor of Christian morals at Harvard University, and in 1860 took orders in the Episcopal Church. He became rector of Emmanuel Church in Boston in 1864, and five years later was chosen bishop of central New York. Besides promoting the establishment of the "Church Monthly," he published "Lessons on the Parables;" "Christian Believing and Living," and many pamphlets and magazine articles.

HUNTSVILLE, a city in Alabama, county seat of Madison county, called "Queen City of the Mountains." It is beautifully situated on a spur of the Cumberland Mountains, and has extensive railroad connections. The surrounding country is agricultural, dairying, and fruit-raising. It is the seat of a good public school system, an institute and college for men, a Methodist Episcopal college, a state normal school, a Presbyterian seminary, and a normal school for colored students. There are numerous churches and a fine courthouse. The manufactured products embrace railroad machinery, farming implements, ironware, cotton, cotton-seed oil, ice, and lumber products. Gas an electric lights, city water, and a public library are among the facilities. Population, 1900, 8,068.

HUNYADY (hoon'yod-e), **Janos**, military hero of Hungary, born near the close of the 14th century. During his time the Turks

endeavored to conquer Hungary and strike terror to the Christians. His military activity began in 1437, when he protected Hungary against Turkish incursions and stayed the attempts of nobles to suppress common rights. In 1442 he liberated Transylvania from Turkish rule, which he followed up by conducting expeditions south of the Danube. In 1456 he captured Belgrade and made it one of the Hungarian possessions. From 1445 to 1453 he served as governor of Hungary. His eldest son, Ladislaus, was beheaded at Buda, but his younger son, Matthias, displaced other claimants and ruled Hungary a term of years. Hunyady died in 1456.

HURON, Lake, one of the five Great Lakes of North America, next in size to Lake Superior, including an area of about 21,000 square miles. The altitude is 578 feet above sea-level; greatest depth, 850 feet, and length about 265 miles. It forms a portion of the natural boundary between Michigan and Canada. There are about 3,000 islands, of which Grand Manitoulin is the largest. This island has a length of 105 miles, is from four to twenty-five miles wide, and contains prosperous settlements. The bays are Saginaw and Thunder on the west, and Georgian on the east, though there are numerous others of less importance. The water is pure and clear. Many valuable species of fish abound. Good harbors are plentiful, including those at Bay City, Port Huron, and Collingwood. The most important streams flowing into it include the Saginaw and Au Sable rivers. Lake Huron receives the discharge from Lake Superior through the St. Mary's River, and is connected with Lake Michigan by the Strait of Mackinaw.

HURON INDIANS, a tribe of North American Indians, which formerly occupied the lake region of Ontario. They were classed with the Huron-Iroquois family. Among the Indians they were generally spoken of as the Wyandottes, and by that name they have been known since 1751, but they were designated as Hurons throughout early colonial times. They were frequently at war with the more powerful Iroquois, for which purpose they became allied with the Algonquins at different periods, but by the middle of the 17th century were driven westward to the vicinity of Lake Superior. In 1632 the Jesuits started missions among them, and by 1670 had gathered most of the tribe in the vicinity of Mackinaw. The operation of these missionaries caused many to embrace the Catholic religion and to learn the French language. Subsequently some of them drifted into territory occupied by the United States. In 1812 they aided the British, and in 1832 a reservation was formed on the present site of Kansas City, Kansas, which was known as the Wyandotte. Subsequently the larger part of the tribe was settled on the Quapaw reservation, where it numbers about 300. The Hurons remaining in Ontario, Canada, occupy a region near Quebec, where they have been intermixed largely with the French. Many have adopted civilized arts and are advanced in education.

HURRICANES See **Storms.**

HURST, John Fletcher, bishop, born near Salem, Maryland, Aug. 17, 1834; died May 4, 1903. After attending the universities of Halle and Heidelberg, Germany, he returned to America, and in 1858 became pastor of Methodist churches at Passaic and Elizabeth, New Jersey. In 1866 he took charge of the Methodist institute at Bremen, Germany, and returned to the United States in 1871, when he became professor of historical theology in the Drew Seminary in Madison, New Jersey, and was made president of that institution in 1873. The general conference at Cincinnati in 1880 elected him bishop. As a pulpit orator and lecturer he stands preëminent. His publications include "Life and Literature of Germany;" "History of Rationalism;" "Outlines of Bible History;" "History of the Reformation," and "Country and People of India and Ceylon."

HUSS, John, religious reformer of Bohemia, born in Hussinetz, Bohemia, in 1373; suffered martyrdom July 6, 1415. After studying in his native town, he took an extended course at the University of Prague, where he received a degree in 1393 and commenced to lecture on theology and philosophy in 1398. As early as 1391 he began the study of Wycliffe's writings, which made a deep impression upon him, and after beginning to preach he denounced with vigor auricular confession, papal indulgences, and masses for the dead. In this course he was violently opposed by the monks and clergy, and in 1410 Archbishop Sbynko burned 200 volumes of the writings of Wycliffe, and on complaint had Pope Alexander V. summon Huss to Rome. Two years later he opposed vigorously a bull of indulgence published by Pope John XXIII., and, when that potentate summoned him to appear at Rome, Huss refused to comply, and was excommunicated and Prague interdicted. However, he continued his opposition by boldly writing and lecturing against the practices of the church, in which he was aided greatly by the people of Prague, through whose influence he was relieved from excommunication, but was again interdicted in 1413. From this he appealed to a general council and to Christ, and in a book entitled "On the Church" he condemned papal abuses and denied the unconditional supremacy of the pontiff. The nobles and common people gave him vigorous support, and he was provided with a safe conduct by Emperor Sigismund while attending the general council at Constance. On November 3 he reached Constance and on the 28th of that month was imprisoned in a cathedral, and later in the castle of Gottleben, in spite of the protest of Polish and Bohemian

nobles. On June 5, 1415, a formal trial of his case was begun, but with little regard for equity, and on the 6th of July thirty-nine charges were placed against him, some of which he denied, but others he admitted as embracing his doctrine. Refusing to recant alleged errors until error should be proven, he was condemned to be burned at the stake. He suffered martyrdom the same day, and his ashes were consigned to the Rhine. The life of Huss stands as one of the noble examples of devotion to freedom in religious thought. His writings, though devoted wholly to a discussion of questions pertaining to the church and state, had a lasting influence on the life and literature of Bohemia.

HUSSITES (hŭs'īts), a powerful organization that honored John Huss and Jerome of Prague as martyrs, and after the death of the former took up arms in defense of their religious principles. Under the leadership of Johann Ziska they captured Prague and successfully opposed Emperor Sigismund, whom they charged with breaking his pledge in furnishing safe conduct to Huss. There were two parties among the Hussites, known as the Calixtines and Taborites. The former comprised the so-called moderate Hussites, who, later, by the compact of Prague, in 1433, united with the Catholics. During the union of both branches the priests and monks were punished excessively, but when they became separated a weakness appeared and the Taborites were defeated in a battle at Bomischbrod on May 31, 1434. Subsequently their political influence declined, and for religious purposes they became united with the Bohemian Brethren.

HUTCHINSON (hŭch'in-son), **Anne,** religious enthusiast, born in Alford, England, in 1591; died near New Amsterdam (now New York City), in August, 1643. She and her husband came to America in 1634, settling in Boston, Mass. Her peculiar religious views and severe denunciation of the Massachusetts clergy in public lectures caused her to be tried for heresy and banished from Massachusetts. Shortly after she bought the island of Aquidneck from the Narragansett Indians and founded Portsmouth. Her husband died in 1642, when she settled in Connecticut, and the following year she and her family were massacred by the Indians.

HUTCHINSON, a city in Kansas, county seat of Reno county, on the Arkansas River, 225 miles southwest of Kansas City. It is at the junction of several important railroads, and surrounded by a fertile agricultural and dairying country. In its vicinity are vast beds of pure rock-salt. The public school system is well organized, and it has a fine courthouse and many churches. It is also the seat of the state reformatory, has many beautiful residences, and a large trade in merchandise. The municipal facilities embrace electric lights, waterworks, a public library, and a street railway system. There are manufactures of matches, creamery butter, ironware, flour, salt, cigars, and machinery. Population, 1900, 9,379.

HUTTON (hŭt'on), **Lawrence,** author, born in New York City, Aug. 8, 1843. He secured a good education in New York and traveled abroad. In the meantime he began contributing to newspapers and periodicals, among them the "New York Evening Mail" and "Harper's Magazine." His writings embrace "Literary Landmarks of Jerusalem;" "Artists of the Nineteenth Century;" "Portraits in Plaster," and "Other Times and Other Seasons."

HUXLEY (hŭks'lī), **Thomas Henry,** naturalist and philosopher, born in Ealing, England, May 4, 1825; died in Eastbourne, June 29, 1895. His early education was under his father and included a wide range of reading and self-study. Later he studied three years at Charing Cross Medical School and in 1845 received a degree from the University of London. About the same time he became assistant surgeon on the ship Rattlesnake, spent four years exploring in the South Pacific, and at the same time investigated natural phenomena. While on this voyage he visited New Guinea, Australia, and other portions of Australasia. In 1851 his ability was recognized by an appointment as fellow of the Royal Society, and in 1854 he became professor of physiology in the Royal Institute. When Darwin's "Origin of Species" appeared, in 1859, he became an advocate of the doctrine of organic evolution. In 1869 he was made president of the Geological Society; the following year secured a like position in the Ethnological Society, and was similarly recognized by a number of other organizations, becoming president of the Royal Society in 1885. His researches include many lines of scientific investigation, and his lectures and writings give him a reputation for much argumentative vigor and profound knowledge. Hæckel wrote of Huxley as the most eminent English zoologist. His writings include "Affinity of Oceanic Hydrozoa;" "Anatomy of Vertebrated Animals;" "Anatomy of Invertebrated Animals;" "Physical Basis of Life;" "Man's Place in Nature;" "Introduction to Zoology," and "Science and Culture." His celebrated discussions regarding theology with Gladstone, the duke of Argyll, and others have given to the world

T. H. HUXLEY.

a number of helpful treatises. He defined an agnostic as one who refuses to adopt a statement which is not susceptible of scientific proof, and his "Physical Basis of Life" proves that he was not a pure materialist.

HYACINTH (hī'ă-sĭnth), a genus of flowering plants belonging to the liliaceæ. There are many species, several of which are highly popular as garden flowers, especially the bluebell hyacinth. Dutch traders first brought the hyacinth to Europe from its nativity in the Levant in the early part of the 16th century. Since then it has been greatly improved by cultivation, and bears many kinds of beautiful flowers of various colors. The bulb is stout and onion-like, the leaves fleshy and linear, stamens six in number, one style, and seeds numerous. At Haarlem, Holland, are the most extensive bulb gardens in the world, where the finest double-flowering varieties have been originated. In early times it was cultivated in Asia Minor and as far east as Persia, where it is still a favorite flower. Many beautiful romances and literary productions mention the Oriental hyacinth, but it has entered modern literature of all countries with even greater latitude.

BLUEBELL HYACINTH.

HYACINTHE (e-ă-săn't), **Pere.** See **Loyson.**

HYBRID (hī'brĭd), an animal or plant produced by the union of two distinct but closely allied species or genera. Extensive experiments have been made in relation to the crossing of species, and, while material knowledge and productive results have been obtained, there is yet a wide field for experimental investigation. It is quite certain that successful crossing extends largely to different genera, but that offspring will not result from the union of different orders. Plant hybrids are produced artificially by applying the pollen of one species to the stigma of a plant closely allied. The theory that hybrids are uniformly sterile and that this sterility is provided in nature to prevent the confusion of species was long held by scientists. Darwin pointed out in his "Origin of Species" that this view is generally erroneous, and that two fundamentally different facts have been confounded by many writers, namely, the sterility of species when first crossed, and the impotence of the hybrids produced from them. His views imply that the sterility of various hybrids has arisen from divers causes and not from natural selection. He also thought that crosses between varieties, called mongrels, are not uniformly sterile. From this he concluded that there is nothing in the phenomena of hybridization from which to conclude that species had not existed at first as varieties.

Hybrids are secured among animals between the toad and the frog; between the swan and the goose; among fishes by artificial impregnation between different species of carp; among mammals between the tiger and the lion, the fox and the wolf, the ibex and the goat, the horse and ass, the he-goat and the female-sheep, and from the horse and zebra. In many cases the hybrids are sterile, even though the crossing may be brought about without difficulty; while in other cases much more difficult the hybrids produced have fertility. Generally it is impossible to secure offspring from crossing different species, but where it is possible it takes place between animals or plants having a fair degree of likeness. Some hybrids are sterile among themselves, but fertile with their parents. Usually the degree of fertility depends upon various physical peculiarities differing in degree among various species.

HYDE PARK, a popular pleasure resort at London, England, occupying an inclosure of 400 acres. Formerly it was a park of the manor of Hyde, belonging to Westminster Abbey, but in the reign of Henry VIII. the grounds came into possession of the crown.

HYDE PARK, a town of Norfolk county, Mass., on the Neponset River, about eight miles south of Boston. It contains excellent schools, a fine library, and is a favorite residence place for Boston business men. There are excellent municipal facilities, including an extensive street railway system. The manufactures include machinery, cotton and woolen goods, and curled hair. Population, 1900, 13,244.

HYDERABAD (hī-der-ä'băd), capital of the state of Hyderabad, India, situated on the Musi River, and connected by railway with important trade centers. Its principal buildings include the Nizam palace, British government buildings, and a number of important Mohammedan institutions, among them a college founded in 1590. The Jama Musjid, a celebrated mosque, is built on the pattern of the great mosque at Mecca. There are many fine schools, churches, hospitals, and municipal improvements. The city has beautful streets, several parks, extensive gardens, and is noted for its manufacture of silks, turbans, woolen and cotton goods, and machinery. Population, 116,330.

HYDER ALI (hī'der ä'lee), celebrated Indian prince, born in Mysore, in 1718; died Dec. 7, 1782. He was the son of a general of the rajah of Mysore, succeeded to the same office, and also obtained Bangalore in fief as an inheritance. In 1759 he became regent ruler of Mysore, and added Onor, Bednor, Calicut, and other adjacent districts to his dominion, making a total of about

84,000 square miles. His attention was also turned to the development of agriculture, commerce, and educational arts, and by reorganizing the army he was able to persevere successfully against the encroachment of the British. While the latter were in war with the French in 1778, he and his son, Tippoo Sahib, occupied the country within forty miles of Madras, but they were later defeated under Sir Eyre Coote. His son succeeded him and likewise promoted civilized arts and protected religion, but he and his people were finally suppressed by the British.

HYDRA (hī'drȧ), in Greek mythology, a monster serpent with nine heads. It was the offspring of Typhon and Echidna, and infested the vicinity of Lake Lerna, where it committed great depredations among the herds. To slay this monster was one of the twelve labors of Hercules. Accordingly he proceeded in the task, being assisted by his servant Iolaus, but as the heads were stricken off by his club two new ones grew forth. Hercules next burned away the heads of the hydra; the center head, being immortal, he buried under an immense rock. Into the poisonous blood of the monster he dipped his arrows, which ever afterward rendered wounds inflicted by them incurable.

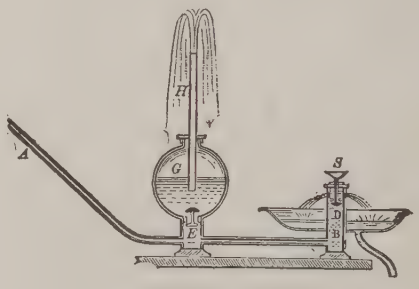
HYDRANGEA (hī-drăn'jē-ȧ), a genus of plants native to Eurasia and America, including about forty-five species. They are favorite plants on account of the size and beauty of their flowers. The stalk is shrubby, leaves oval, and flowers showy and greatly variegated in color. They are em-

SNOWY-LEAVED HYDRANGEA.

ployed in Japan to make a kind of tea and elsewhere in the preparation of medicine. Among the cultivated varieties are the snowy-leaved and oak-leaved hydrangeas.

HYDRAULIC ENGINES, the machines propelled by the pressure of a column of water, and differing from the steam engine in that the piston of a cylinder is driven by water-power instead of by steam. In construction they are similar to steam engines, but, as the pressure under which they work is greater, they are usually smaller than the engines employing steam. The plungers in the cylinders are forced outward by the water being admitted through valves, and, when the outward stroke is completed, the water escapes from the cylinder, the plungers slide inward, and are again forced outward by a new supply of water. Some hydraulic engines are known as single-acting, while others of a different construction are double-acting. Generally the entire water pressure is cut off at the end of the outstroke, and the water exhausts by a valve after serving its purpose. The speed is usually slow, as power is increased by a corresponding decrease of speed, but the pressure is magnified so intensely that engines of this class are exceedingly powerful.

HYDRAULIC RAM, a machine for raising flowing water to a greater height than that of its source. It is utilized only where



HYDRAULIC RAM.

there is an abundant supply of water, for the reason that a portion of the water is wasted in the operation. In the hydraulic ram the momentum imparted to water in falling is utilized, this being sufficient to carry it to a height greater than that of the source, where it is held in place by the uplifting-valve *E*. Valve *D* is located in a supply-pipe *AB* beyond the uplifting-valve *E*, which is closed periodically by the velocity of the water running down the supply-pipe. Successive reaction causes alternate jets of water to pass the uplifting-valve *E*, into the chamber *G* above, in which the air becomes compressed. The valve *D* at the end of the supply-pipe opens as soon as the pressure into the air chamber ceases, when the uplifting-valve *E* closes, and the water passes through the supply-pipe *AB*. The end valve *D* is closed again as soon as sufficient velocity is gathered, and water is forced into the air chamber *G*. A continued series of operations forces the water to the proper height to be utilized for the purpose intended, flowing out of pipe *H* in successive jets. The first self-acting hydraulic ram was invented in 1796 by Joseph M. Montgolfier (1740-1810), who secured a gold medal at the exposition of 1802 held in France.

HYDRAULICS (hī-drą'lĭks), the branch of science that treats of liquids in motion. It describes the flow and elevation of liquids, and the machines for moving liquids or intended to be moved by them. Water is taken as the type, and in theory its principles are those of falling bodies, but they cannot be relied upon in practice except when verified by experiment. The discrepancy arises from various conditions, such as the shape of the orifice; the changes of temperature, which vary the fluidity of the liquid; and friction. Hydraulic engineering treats of the control and management of water by the practical application of the mechanics of fluids, particularly such as are concerned in water-power, artesian wells, canals, hydraulic machines, waterworks, pumps, dams, and water motors. The energy or capacity for work found in pressure transmitted by water is termed hydraulic power, and is exemplified in engineering by water pressure in pipes, cylinders, and channels.

When a fluid is confined in a vessel and a certain amount of pressure is exerted on a given area, an equal amount is transmitted in all directions to every equal area on the walls of the vessel. If the area of the external pressure surface is decreased, the whole pressure may be increased proportionately. It is on this principle that such mechanical structures as jacks, hydrostatic presses, rail-benders, elevators, punches, and lifts are operated successfully. Hydraulic engineering also is concerned with the velocity of rivers, water motors, undershot wheels, overshot wheels, turbines, and breast wheels. In the construction of machinery to employ hydraulic power the principle is utilized that pressure is equal in all directions, area for area, as well as in all parts, which makes it possible to obtain increased pressure by giving a larger surface to the working area against which the pressure is exerted. In this way a magnified pressure is obtained at one end from only a small pressure at the other.

The first hydrostatic press for utilizing this principle dates from 1796, but at that time only the simplest form of the apparatus was known. Since then vast strides of progress have been made in the application of hydraulic power. It may be said that improvements in this line have kept pace with the use of compressed-air apparatus and electric motors. Where great power is required for short intervals, hydraulic power is preferable, since it is not expensive when idle. It is utilized extensively in sheet-punching machines and in riveting. The hydrostatic press is to some extent taking the place of the steel hammer for forming wrought iron and steel. Some of these have a capacity of 4,000 tons; notable examples of vast machinery of this class may be found in some of the larger manufactories of Pennsylvania, in which from six to twenty tons of pressure is secured to the square inch. Another use to which this power is now applied extensively is in tunneling operations. The machinery thus employed is adequate to penetrate through various formations with success, and serves to push aside small boulders with little difficulty. Wherever the nature of the ground permits it, tunneling is carried on most extensively by hydraulic shields. Notable incidents of successful operations of this character within recent years are those at the St. Clair River and the tunneling under the Thames, in London, in 1897.

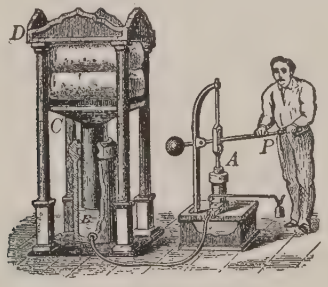
HYDROGEN (hī'drō-jĕn), an element very abundant in nature, occurring as a constituent of water and of all organic compounds. It may be obtained by pouring hydrochloric acid over granulated zinc. If this mixture be confined in a tall jar, an effervescence arises and gas forms at the mouth of the jar, which may be lighted by applying a match, when a large stream of very pale flame shoots into the air. Water may be decomposed into its elements, hydrogen and oxygen, by the action of an electric current. It may also be obtained by bringing the vapor of water in contact with red-hot iron filings. Hydrogen is the lightest substance known, being fourteen and one-half times lighter than air, and 11,160 times lighter than water; hence, it is taken as a standard in comparing atomic weights and volumes. If it be breathed in a pure state, death results, not by poisoning, but from the absence of oxygen. Six volumes of air with two of hydrogen form an explosive. In blast furnaces requiring unusual heat it is burned in oxygen gas, these two elements being necessary to produce the most intense heat.

Pure hydrogen is a gaseous element, is odorless, tasteless, colorless, and slightly luminous when lighted, but intensely hot. It is a powerful refractor of light, and is the only gas that conducts heat. It combines with many of the other elements, but under ordinary circumstances its affinities are not very pronounced. Heat is required to bring about the union of hydrogen and oxygen, and chloride combines with it under the influence of light. Compounds of much utility and importance are formed with or of it, such as ammonia, when combined with nitrogen; hydrochloric acid, when united with chlorine; and hydrofluoric acid, when combined with fluorine. It does not occur extensively in a free state, but escapes as a gas in many of the petroleum regions, such as are met with in Pennsylvania and Ohio. Hydrogen forms, in combination with oxygen, one-ninth part by weight of water.

HYDROPHOBIA (hī-drō-fō'bĭ-ą), a disease communicated by the bite of a rabid animal, due to a specific virus in the saliva. Dogs are the most liable to be afflicted with madness, but there are other animals subject to the disease, particularly cats, wolves, raccoons, and foxes. In hydrophobia the

patient experiences great nervous disturbance, difficulty of swallowing, convulsive dread of water, and spasmodic muscular contractions. The symptoms of the disease appear from six weeks to eighteen months after the bite occurred, and death results about three days after specific symptoms begin. To prevent affection it is advisable to impede the circulation from the wound by bandages, stopping the flow of blood, and cauterizing with an iron at a white heat, or with nitrate of silver, but any burning or cauterizing agency may be used. In 1884 M. Louis Pasteur announced that protection against hydrophobia can be secured by inoculation with a prepared virus. Inoculations are effected by marrow taken from a rabid animal, and are made consecutively, first with weak virus, then stronger, and increased gradually in strength until the strongest obtainable is injected into the system. In this way the parasitic cause of the disease may be destroyed. Institutes have been established in New York, Paris, and other cities where this method has been thoroughly tested, and the patients treated are cured almost universally.

HYDROSTATICS (hī-drō-stăt'ĭks), the branch of science that treats of the pressure and equilibrium of liquids. Its principles



HYDROSTATIC PRESS.

apply to all liquids, but water, on account of its abundance, is taken as the type. A liquid placed in several vessels communicating freely with each other comes to rest in all at the same level, or height. Two or more liquids placed in the same kind of vessels arrange themselves according to their relative densities, after which the equilibrium continues firm and distinct. The law relating to hydrostatics as announced by Pascal is considered fundamental. From it we learn that pressure exerted anywhere upon a mass of liquid is transmitted in an undiminished degree in all directions, and acts with the same force in all directions, and in a direction at right angles to the surfaces upon which it is exerted. It may seem impossible at first thought that a pressure of one pound is sufficient to produce a pressure of one hundred pounds, but this is only an exemplification of the general law of mechanics that applies to both liquids and solids. If a force of one pound on one square inch causes motion by pressing through the medium of one hundred square inches, the velocity of the body moved is only one-hundredth of that of the body applying the pressure.

In the hydrostatic press this principle is taken advantage of by filling two connected cylinders with water, as shown in the illustration. If the smaller cylinder, *A*, has an area of one square inch, and the larger cylinder, *B*, one hundred square inches, then a downward pressure of one pound on each square inch, by means of the lever, *P*, acting on a piston in the small cylinder, lifts a weight of one hundred pounds. *C* is a platform and *D* a strong frame, between which the compression takes place. If the pressure downward be one hundred pounds, it balances ten thousand pounds, and in like proportion the pressure of the hydrostatic press may be increased to two or three hundred tons. This class of machinery is utilized extensively in raising heavy weights, testing anchors, and for other purposes where immense pressure is necessary. Other matters investigated in the study of hydrostatics are the equilibrium of floating bodies; the buoyancy of liquids; their specific gravity, and the four laws of equilibrium. These laws embrace: 1. At any point within a liquid at rest the pressure is the same in all directions. 2. The pressure increases with the depth. 3. The pressure does not depend on the shape or size of the vessel, but on the area and depth. 4. Water seeks its level.

HYENA (hī-ē'nà), a genus of flesh-eating quadrupeds, found in Asia and Africa. They are characterized by strong teeth well adapted to breaking the bones of their prey, extended claws, rough tongue, prominent eyes, long and acute ears, and fore legs longer than the hind limbs. Their gait is shambling, but they are able to move with considerable speed. Long, coarse hairs cover

SPOTTED HYENA.

the body and form a mane and enlargement on the back. They feed on carrion, but also on fresh flesh, and devour carcasses in an advanced state of decay. Their claws are well adapted for digging, on account of which they are reputed to dig into newly made graves. At night they come out of their

places of seclusion and gather in packs like coyotes, often attacking domestic animals and even children. At least four species exist, of which the striped hyena of western Asia and northern Africa has been known longest. The ancients knew of these animals and attributed many peculiar habits to them. A closely similar species called the spotted hyena is found in southern Africa. It has a yellowish color with numerous spots, and is more ferocious and somewhat smaller than the striped. The strand wolf is a species allied to the spotted hyena, has a grizzled-brown color, and is found in the vicinity of the Orange River. The brown hyena is a native of Natal. Remains of extinct species occur in Germany, France, and England. They are known as the cave hyena, from their remains occurring in caves formed during the glacial epoch.

HYGIENE (hī'ji-ēn), the branch of medical science that relates to the preservation and improvement of health, both in individuals and communities. This branch of study has been receiving more and more attention, and by means of modern agencies it has been possible to both improve the general health and prolong materially human life. The period in which delicacy was considered an element of beauty has passed away, and it is now sought to so develop the body in its powers and usefulness that it may be a fit dwelling for the mind and soul. Strength and vigor physically are looked upon as personal and national blessings, while weakness and timidity are deplored. Not only is it sought to provide the most highly sanitary conditions for the preservation of health in individuals, but a public policy is pursued and institutions are maintained under which the most favorable conditions of healthy living may be vouchsafed to all classes of people in rural and urban districts. The establishment of sewer systems in the cities; provision of a water supply; the removal of waste materials, and the regulation of lighting and ventilation of public buildings are the outgrowth of study, and exhibit the public concern that civilized nations have for the best interest of each individual community.

Though public hygiene has been made a subject of investigation by the leading nations for many centuries, definite aims regarding the promotion of public health and the prolongation of human life did not take form until the beginning of the 18th century. Besides, it cannot concern itself specially with the diet of persons, since each individual may choose for himself in relation to the diet of his household and the use of medicines so long as they do not interfere with the rights and welfare of others. However, conditions have been provided in cities whereby individuals may take advantage of public conveniences, that both the comforts and sanitary conditions may be rendered of the highest character for all.

Legislation has been directed with the view of supervising the sale of drugs, liquors, and food articles, thereby protecting purchasers against adulterations, and counteracting tendencies of manufacturers to take advantage of the public by placing on sale articles of great inferiority with the view of inducing their purchase by consumers under the apprehension that they are pure and genuine. Instances of this are the laws regulating the sale of oleomargarine, those preventing the sale of diseased meats, and those forbidding the exposure of persons affected with contagious diseases. Pure air is the more important essential in promoting public hygiene, since we consume it infinitely beyond our consumption of food. This has been recognized by the government and city authorities, which is evidenced in the regulations requiring cleanliness in cities, providing for the grading of sites, and numerous other sanitary measures. Advance in medical science, and the regulation of its practice by the establishment of schools of instruction and rigid examinations for admission to the profession, have likewise been material agencies in public hygiene. Such discoveries as those of Jenner in relation to vaccination against smallpox; those of Koch in the treatment of consumption; the discoveries of antitoxin as a remedy in diphtheria, and many others equally important have had a marked influence in preserving human life as well as preventing a weakening of the general system by diseases long affecting the individual. A proper knowledge and observance of hygienic laws are thus lessening greatly the number of persons afflicted with such diseases as consumption, rheumatism, dyspepsia, gout, cholera, hydrophobia, smallpox, and others.

It is found that one-half the children in some parts of England die before they reach the age of five years, and it is estimated that 100,000 persons die annually in that country from causes easily preventable. What is true of England is true of other countries to a varying extent. It is certain that the movement now in progress looking toward better observance of individual and public rules of health will lessen this fatality. Besides, the advancement of education and public intelligence is having a wholesome effect. One of the most prolific reforms ever effected is that in the case of scurvy, a disease formerly prevalent among sailors, but now entirely avoided by the use of vegetables or lime-juice. Another remarkable evidence of progress is in the construction of jails and prisons, which formerly contained few provisions calculated to maintain the health of those confined, while now the most wholesome sanitary rules are enforced with much care.

Another prolific source of public profit is found in the construction of school buildings. We have learned from past experience that the early years of human life need

especial consideration, since during the formative period it is very important that the different organs of the body be provided with conditions favorable to growth and that overstrain of immature organs be avoided. To effect this the clothing, food, and cleanliness of children need careful attention, while schoolhouses must be well ventilated, lighted, warmed, and provided with adequate sanitary drainage. Child study has also become a branch of intense interest. Teachers everywhere are concerning themselves with the study of the individual capacity of each child, its powers, inclinations, and weaknesses; thereby themselves becoming better fitted to provide especially for the nature and need of each child life. It is not now a question whether children should begin study at four or eight years, but rather when each individual child possesses maturity and strength sufficient to begin the work of the schoolroom. Thus, the prevention of disease by culture, disinfection, sanitary regulations, pure food and water, and other measures for individual and public health have been and are among the immediate duties of all peoples. To cure a disease is wholesome, but to prevent it is far better; such prevention being the object of intelligent application of effort in medicine, instruction, and all lines of progressive institutional development.

HYKSOS, meaning shepherd kings, the name of several Egyptian kings who reigned from about 2200 B. C. to 1700, a period of 500 years. Their capital was at Tanis, the Zoan of the Bible. It is thought that their ancestors were nomadic tribes of Syrians and Arabians in Canaan, who later settled in Egypt, and while there adopted the customs and religion of that country.

HYPNOTISM (hĭp'nō-tis'm), a method of artificially inducing sleep, formerly called animal magnetism and mesmerism, but the results differ from sleep by several striking peculiarities. See **Mesmerism**.

HYSSOP (hĭs'sŭp), a genus of labiate plants native to southern Europe and Asia, but now cultivated extensively in gardens. They are perennial, shrubby plants, grow to a height of two feet, flower from June to September, and have an agreeable aromatic odor. They yield a kind of camphor, but are cultivated more largely for their beautiful blue flowers. There are many species, some of which are mentioned in both the Old and New Testaments. They are spoken of as the symbol of spiritual purification from sin.

I

I, the third vowel and ninth letter of the English alphabet. Up to a comparatively late date I and J were regarded as one character, and in dictionaries the words beginning with these letters were classed together. It has two principal sounds, the long and short. The long sound is represented in such words as find, bind, wind; and the short sound in bill, pin, fill. It also has three minor sounds, as in dirk, intrigue, and the consonantal sound of y, when followed by a vowel, as in billion and Christian. I is also the pronoun by which a speaker or writer denotes himself, being the nominative case of the first personal pronoun of the singular number.

IBADAN (ē-bä′dän), an important town of western Africa, in the Yoruba country, seventy-five miles north of the Bight of Benin. It contains twenty-five mosques, a system of Mohammedan schools, and numerous temples. There is a considerable trade in live-stock, clothing, and fruits. Population, 98,650.

IBEX (ī′bĕks), the general name of several species of wild goats, of which the common ibex is the best known. This species is about five feet long from the nose to the tip of the tail, and is two feet eight inches high at the shoulders. The horns are large, about thirty inches long, have flattened sides, and

IBEX.

contain numerous ridges and knots. In the common ibex, or steinbock, the hairs are short and thick, reddish-brown in summer and grayish-brown in winter, and the beard is short and dark. The females have shorter horns than the males and are of an ashy color. This species of ibexes inhabits the Alps of Europe and the Spanish side of the Pyrenees. Three other species are found in Asia and in the Abyssinian Mountains. Their habits are similar to those of other wild goats, preferring the highest mountains, and being skilled in passing over precipitous places.

IBICUI (ē-bĕ-kwē′), a river in the province of Rio Grande do Sul, Brazil, which is formed by the Rio de Santa Maria and several other sources, and after a course of 400 miles joins the Uruguay near Yapeyu. Its upper branch is called Ituzaingo.

IBIS, a genus of wading birds allied to the storks, herons, and spoonbills. There are different species widely distributed in Amer-

SACRED IBIS.

ica, Eurasia, Africa, and the islands of the sea. The red or scarlet ibis is an American bird, and is found most abundantly in the Amazon regions of South America. It is about three feet long, the extended wings measure over three feet, and the bill is about seven inches long. The white ibis abounds in Florida, the strawneck ibis in Australia, and the glossy ibis, a bird of remarkable silky plumage of dark green color, is found in Eurasia and Egypt. However, the most remarkable species of this genus of birds is the sacred ibis, which is found throughout Africa. It was worshiped by the ancient Egyptians. It was reared by them in temples with much care, and after death was embalmed. This bird is about the size of a common fowl, has white plumage with

black tips on the wings, and a bare head and neck. It formerly inhabited the Lower Nile, but is found farther south at present, in the regions of the lakes and Central Africa. The flight of ibises is rapid. They lay three or four eggs, which are considered excellent as food, but the flesh is not eaten, except by natives. Being aquatic birds, they prefer to feed on fish, mollusks, frogs, and other forms of animal life common to rivers and the sea.

IBRAHIM PASHA (ib-rä-heem' pä-shä'), viceroy of Egypt, adopted son of Mehemet Ali, born in Kavala, Roumelia, in 1789; died in Cairo, Egypt, Nov. 9, 1848. He became associated with the Egyptian army at an early age, and attained successes against the rebel tribes of Upper Egypt and the Mamelukes in Nubia. In 1816 he defeated the Wahabis of Arabia, after which he returned to Cairo and began to discipline his forces in accordance with the military rules of Europe. In August, 1824, he led an expedition for the Turks against the Greeks, who had risen to establish Hellenic nationality. The allied forces of France, Russia, and England having defeated the Turkish and Egyptian fleet at Navarino in 1827, Ibrahim was recalled to Egypt, where he again occupied himself by reorganizing the army and navy. In 1831 he attained successes on the coast of Syria, took Gaza, Jaffa, and Kaiffa, and laid siege to Acre. The following year he pushed forward to Damascus and defeated a powerful Turkish army at Konieh, but the prizes gained by force of arms were limited by the powers to Syria. In 1839 war broke out anew and Ibrahim attained success over the Turks at Nezeeb, but, by the interference of the British, Syria was restored to Turkey in 1841. Ibrahim visited various countries of Europe in 1846 and two years later succeeded his father as viceroy of Egypt, but died a few months after being formally confirmed in that office. His son, Ismail, succeeded him and became the first khedive of Egypt.

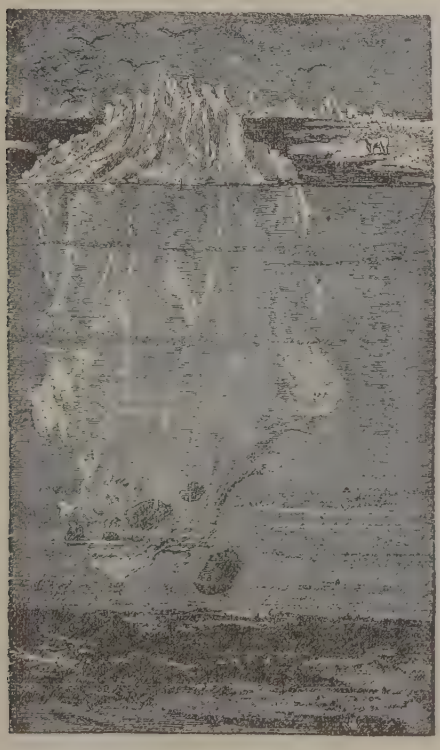
IBSEN (ĭb'sĕn), **Henrik**, poet and dramatist, born in Skien, Norway, March 20, 1828. He was apprenticed to a chemist at Grimstad in 1842, but soon after took up the study of literature. In 1850 he was admitted to the Christiania University as a student, but did not complete a course. He next engaged for two years in journalistic work, and then became director of the theater at Bergen, which was owned by Ole Bull. While there he published dramas and lyric poetry and in 1857 became director of the national theater in Christiania, where he also continued his literary employment. In 1864 he traveled extensively, residing consecutively at Rome, Dresden, and Munich. His writings are realistic and designed for moral purposes. They aroused marked attention in Germany, the United States, and England, as well as in Scandinavian countries. The parliament of Norway granted him a pension in 1866. His writings include "Warriors in Helgoland;" "Pillars of Society;" "Lady from the Sea;" "Master Builder;" "Emperor and Galilean;" "Lady Inger at Ostrat," and "An Enemy of the People."

ICE, the name of water when congealed or frozen into a solid mass. This occurs in case the temperature of water is reduced to 32° Fahr., when a condition is reached which is designated as zero on the Reaumer and Centigrade scales. At 39.2° Fahr. water begins to expand as the cooling process goes on, and continues until 32° is reached. Thus a given quantity of ice is lighter than an equal quantity of water, on account of which ice floats on the surface of water. It is due to this fact that the lakes and oceans do not freeze solid, since the protective covering formed by ice on the surface prevents the escape of heat stored in the water. If it were not for this phenomenon, the solid masses of ice formed in large bodies of water would not be melted by the heat of a tropical sun in the warmer seasons of the year, and at least three-fourths of the earth would be incapable of sustaining its present life. The freezing point is affected by various circumstances, such as pressure and ingredients held in solution by liquids. With an increase of pressure on a liquid the freezing point is lowered, and it is raised by a removal of pressure. Bodies of water holding salts in solution, as is the case in the ocean and other salty bodies, require a lower temperature than pure water. The freezing point of sea-water is about 28° Fahr., varying somewhat with its saline ingredients and atmospheric pressure. Water at perfect rest and not containing dust particles requires a lower temperature to be congealed into ice, since in that state it more effectually retains its latent heat. In freezing salty water the saline matters are separated, and the ice when melted yields water fresh and pure.

The formation of ice has a marked effect in disintegrating rocks and stones. This is due to the circumstance that water fills the cavities and pores, and by the expansion that results in freezing large pieces are broken off. The largest masses of ice occur in nature in the form of glaciers and icebergs, and in their clefts the deep-blue of pure ice is most beautiful. Ice formed in nature and by machinery is an important article of commerce, and is transported in large quantities for general consumption. Ice-cutting tools for harvesting the ice of rivers and ponds are numerous. The ice is cut into large blocks by an ice-plane, which is usually moved by one or two horses. These blocks are cut about two feet square, though this depends somewhat upon the thickness, about eighteen inches being preferred. After the blocks are cut they are severed from each other and loaded in wagons to be transferred to an ice-house, in which the ice is preserved for consumption.

The manufacture of ice is an important

industry in countries where it does not form in nature, and also in the large manufacturing establishments where perishable articles are produced, such as packing houses and canning factories. This enterprise began to develop about fifty years ago, but only within recent years has the industry taken on extensive proportions. The process involves lowering the temperature below the freezing point by permitting pure ammonia liquid to expand within iron pipes that are coiled in tanks filled with salt brine, from which the heat is drawn by the ammonia in evaporating. The machines consist generally of a congealer, in which the evaporization of the ammonia takes place; a pump for



ICEBERG.

aspirating the gas as it forms in the vaporator, and a condenser. In the latter the gas is compressed by a pump, the liquefaction being aided by a condensing stream of cold water, and by this means the ammonia is restored to its original state, being used successively for the same purpose. Cans filled with pure water are set into the brine-tanks and there frozen. The cans contain from one hundred to 300 pounds of ice, but in recent years the manufacture has tended more largely to the production of plate ice. It is obtained in this form from pure water in sheets about eight by twenty feet in size, and with a thickness of ten to fifty inches. These are next cut into blocks suitable for transportation. It requires from five to ten days to form plate ice of these dimensions, the time depending somewhat upon the outside temperature. In some factories sulphurous oxide is utilized instead of ammonia, and the brine is made of magnesium chloride instead of salt. Scientists have also perfected machinery for the production of liquid air (q. v.), which is taking the place of ice in refrigerators and for other purposes.

ICEBERG (īs'bĕrg), a large mass of ice, usually floating in the ocean, but sometimes located on the shores or on breakers. These phenomena arise from glaciers that move through channels, from which, when they reach the shore of the sea, large masses glide into the ocean, thus forming icebergs. They are seen both in the northern and southern seas in latitudes between 68° and 70°, but also in different temperatures, though rarely reaching nearer the equator than 40° N. and 39° S., owing to their melting in the warmer regions. In size they differ widely, sometimes attaining a circumference of several miles and rising to a height of 250 to 300 feet above sea-level; about one-ninth of their volume is seen above the surface. The bluish-green tint of the solid ice-masses is very beautiful, and in their cavities fresh water often occurs from the melting ice. In some regions they are carried by winds and oceanic currents into warmer seas, where they give rise to fogs, but melt rapidly. Large masses of rocks and earth are carried by them, also seeds of plants and sometimes animals. Ice covering a large portion of the sea is called an ice field; a small field is designated a floe, while one broken up forms an ice pack.

ICELAND (īs'land), an island of volcanic origin, situated in the North Atlantic Ocean, about 230 miles southeast of Greenland and 600 miles west of Norway. It has an area of 39,800 square miles, about the size of Kentucky, and is 300 miles long from east to west, with a central breadth of 200 miles. Its coast lines are indented by great bays or fiords, and adjacent to it are many small islands. The surface is diversified by many mountain chains, several of which contain active volcanoes. Numerous lakes abound and many streams penetrate through the valleys, of which the Thjorsa, Skja Danda, Jokulsa, and Axarfirdi rivers are the most important. Geysers are distributed in many portions, but are found most numerously in the southwest, near Reykjavik. Sulphur is the most abundant mineral, but there are also deposits of rock crystal, chalcedony, refracting spar, and brown coal.

The climate of Iceland is extremely cold, but mild considering the latitude, while the summers are short and damp. Vegetation abounds only in narrow confines, mostly along the coast, and the timber is limited to several stunted varieties, the principal tree being the birch. Other plant growths include

bilberry, heath, and lichens. Manufactures are largely of a domestic nature, such as earthenware, clothing, utensils, leather, and canned fish. The principal imports include breadstuffs, timber, hardware, clothing, sugar, and tobacco. Among the chief productions are cattle, sheep, potatoes, radishes, vegetables, horses, and ponies. There are exports of seal-skins, sulphur, wool, cattle, fish, eider-down, and the edible Iceland moss.

The history of Iceland begins with the end of the 8th century, when scattered settlements were made by Irish emigrants. Shortly after people immigrated from the Scandinavian countries, and in 870 Harold Haarfager by his arbitrary rule caused many Norwegians to emigrate to Iceland. By 925 the coast regions were largely populated and an aristocratic republic was formed, which existed through several centuries. In 981 Christianity was introduced, schools were established, and considerable advancement was made in agriculture, commerce, and other civilized arts. At that time Iceland attained to its highest degree of prosperity. Within that period Greenland was discovered, in 983, and North America visited under Lief Ericsson about 1001. Magnus VI. of Norway annexed Iceland to his dominion in 1264. In 1380 it was made a territory of Denmark, and since then has remained a Danish possession. The inhabitants are of Scandinavian origin and speak the oldest form of the Scandinavian group of languages. Their literature is extensive. It has been enriched by translations from many master productions of German and English writers. The Sagas are histories and works of a romantic character, and have been translated into various languages, forming at present an interesting portion of school-reading in many countries.

The government is administered under a constitution adopted in 1874. It is vested in the governor and the althing or parliament. The latter is the local legislative body. It consists of thirty-six members, six members being nominated by the king of Denmark and forming the upper division, and the remainder, or lower division, being elected by popular suffrage. Practically all the people belong to the Lutheran Church. There are elementary schools, several colleges, and a university at Reykjavik. This city, located in the western part, is the most important seaport and the capital of the island. The population of Iceland is 76,650.

ICHNEUMON (ĭk-nū′mŏn), a genus of carnivorous animals belonging to the civet family, and noted for their destruction of rats, mice, and other quadrupeds. They feed also on reptiles, insects, and the eggs of crocodiles, and on account of devouring the latter were held sacred among the Egyptians. The best known ichneumon is found in Egypt, and a smaller kind in India. Several of the species are kept as useful domestic animals in many homes of Egypt and Asia, serving to destroy pests. The Egyptian ichneumon is somewhat larger than a

EGYPTIAN ICHNEUMON.

cat, yellowish-brown in color, and has a long tail.

ICHNEUMON FLY, a family of insects, including many species. They are noted because of depositing their eggs in the bodies or eggs of other insects. In hatching their eggs produce larvæ which devour the eggs or animals, either mature or immature, in which they are developed. When the insect reaches maturity, the worm on which it fed expires from exhaustion, and the fly begins to feed on the juices of plants. In this way they are of vast benefit to man, since they destroy grubs, caterpillars, the Hessian fly, and other pests, while they themselves are harmless in a state of maturity. The adult ichneumon does not attack insects, except to make a deposit of eggs, which it does by making a minute puncture.

ICHNOLOGY (ĭk-nŏl′ŏ-jў), the branch of science which treats of fossil imprints. The rocks bearing fossil footprints or other impressions are found largely in mud deposits, but occur also in sandstone. See **Fossils.**

ICHTHYOLOGY (ĭk-thĭ-ŏl′ŏ-jў), the branch of zoology that treats of fishes. Aristotle is the most eminent ancient authority on this science, and is practically the only writer of ancient times to furnish data of value regarding fishes, their habits, and culture. Modern treatises date from the middle of the 16th century. Among the most eminent writers are Max-Müller, Agassiz, Cuvier, Owen, and Pierre Belon (1518-64). See **Fish Culture.**

ICHTHYOSAURUS (ĭk′thĭ-ŏ-sa′rŭs), a remarkable fossil reptile that inhabited the sea in the period when the secondary strata

REMAINS OF THE ICHTHYOSAURUS.

were deposited. The form was porpoise-like. It had four paddle-like limbs, an enormous head, long tail, and broad vertebræ resembling those of fishes. Fossil remains of this animal occur from the lower Lias to the Chalk periods, but more numerously in the Lias Oolite. The species discovered include

more than thirty, some resembling the gavial of the Ganges, and others the common crocodile.

IDA, a mountain range of Asia Minor, forming the southern boundary of the Troad. It extends from Phrygia into Troad, and at its foot was the city of Troy. Mt. Gargarus, height 5,745 feet, is the culminating peak. This range of mountains is celebrated in ancient mythology as the place from which the gods witnessed the battles of the Trojan War. The highest peak of the mountain chain that trends on the island of Crete from east to west is known by the same name. It is covered by beautiful forests of maple, cedar, and pine, and is noted for its alleged connection with the education of Zeus, the chief Grecian god. Its height above sea-level is 8,050.

IDAHO (ī'dą-hō), a northwestern state of the United States, bounded on the north by the Dominion of Canada, east by Montana and Wyoming, south by Nevada and Utah, and west by Oregon and Washington. Its length from north to south is 490 miles and area 84,800 square miles, about the size of the combined areas of New York, Maine, and Delaware. The lofty ranges of the Rocky Mountains trend between it and Montana, but the larger part of its surface also is mountainous. Fremont Peak, near the boundary between it and Wyoming, has an elevation of 13,570 feet, and is one of the lofty elevations, but there are others that attain to heights of nearly the same altitude. Many of the valleys have productive soil, and under a system of irrigation have been made to yield abundantly. The forests include an area of 7,000,000 acres, which yield extensive products of white pine, tamarack, fir, cedar, spruce, hickory, cottonwood, juniper, birch, and willow. Among the principal streams are the Boise, Snake, Salmon, Spokane, and the Charles Fork of the Columbia River. There are several lakes, including Kaniksu, Pend d'Oreille, and Bear lakes. While the latitude of Idaho is the same as that of Switzerland and France, its climate is milder than that of Ohio. The mean temperature at Boise City is 51°, and of northern Idaho 54°.

The state has a large area of soil adapted to agriculture, but on account of the limited rainfall irrigation is necessary, except in the northern portion. Among the chief agricultural products are wheat, oats, barley, corn, potatoes, and hay. Vegetables and fruits are produced abundantly, but the production of these and all cereals depends upon altitude. Stock-raising is a profitable industry, and includes the rearing of horses, mules, cattle, sheep, and swine, though the cattle industry is by far the most important and next to it is sheep-raising. The mineral wealth is extensive; the most important minerals are gold and silver. Other mineral products include quicksilver, copper, coal, iron, lead, magnesia, sulphur, salt, and soda. The manufactures are developing rapidly on account of the many resources of the state, and embrace machinery, farming implements, textile fabrics, earthenware, canned fruits, and building material. Railroads and highways have been built extensively, while telegraph and telephone lines abound in all the settled portions of the state. The total railroad lines now aggregate 1,450 miles.

Public instruction is receiving marked attention, the educational institutions including, besides the district schools, two normal schools for the education of teachers and a state university at Moscow. The courses of study provide amply for high school work, which is supplemented by several private secondary schools and business colleges. There are representative daily, weekly, and monthly periodicals, scientific and religious societies, and associations for the promotion of industrial and educational arts. The normal schools are located at Albion and Lewiston, and contain courses adequate to the need of teachers trained for the profession. Ample provisions have been made for the care of unfortunates, and also for benevolent, reformatory, and correctional purposes. The per cent. of illiteracy is among the lowest in the nation, and the rate of insanity is less than one-half that of the average in the United States. Its soldiers' home is one of the most excellent institutions of the state, and is supported by liberal appropriations.

Idaho was acquired by the Louisiana purchase, and the first explorations were made by Lewis and Clarke in 1805-6. In 1858 gold was discovered on the Oro Fino Creek, after which settlements began to develop rapidly, and on March 3, 1863, Idaho was created a territory by act of congress. In 1890 it was admitted to the Union as the forty-fourth state, and the thirty-first under the federal constitution. The name Idaho is an Indian word meaning "gem of the mountains." Boise, in the western part of the state, is the capital. Other cities are Idaho Falls, Moscow, Pocatello, Wallace, Lewiston, and Montpelier. The state has grown constantly in population, the growth in the last decade being 92 per cent. In 1880 its population was 32,610; in 1890, 84,385; in 1900, 161,772. The total colored population is 7,277, or 4.5 per cent. This includes 293 Negroes, 1,291 Japanese, 1,467 Chinese, and 4,226 Indians.

IDDESLEIGH (ĭd'es-lĭ), **Stafford Henry Northcote**, statesman, born in London, England, Oct. 27, 1818; died Jan. 12, 1887. He was educated at Eton and Oxford, became private secretary to Gladstone in 1843, and in 1847 was admitted to the bar at Middle Temple. In 1855 he was elected to parliament as a conservative, and in 1867-68 was secretary for India. He served on the British commission to adjust the Alabama Claims with the United States, in 1871. Later he held several important offices with success,

but resigned in 1887. The University of Edinburgh made him lord rector in 1883. His publications include "Twenty Years of Financial Policy;" "Lectures and Essays," and "Pleasures, Dangers and Uses of Desultory Reading."

IDEA (ī-dē'à), any product of mental apprehension or activity considered as an object of thought. Plato regarded ideas as the eternal and immaterial forms of all material things, while Kant treated them as the primitive elements of intelligence, not as products, and modified and developed the Platonic theory of innate ideas into the modern doctrine of intuitions. See **Intuitions.**

IDEALISM (ī-dē'al-īz'm), in philosophy, the doctrine held in contradistinction to realism. According to realism three positively distinct things are implied and involved in any act of vision. For instance, in seeing a book there are the book, the image or apprehension of the book, and an apprehending mind, ego, or self. These three facts are dealt with in idealism as subjective, objective, and absolute. In subjective idealism is taught that the book and the image are one thing, and that a modification of the mind is the only thing that is perceived. According to objective idealism the book and the mind are existences equally real or ideal, but they are regarded manifestations of an objective fact of some kind. Absolute idealism teaches that the only thing really perceived is the idea or relation, of which the mind and the book are but two terms, and to which idea or relation they owe all the reality they have. Idealism has been influenced more or less by the teachings of Plato. The modern advocates of it include Fichte, Kant, Schelling, Berkeley, Hegel, and Descartes.

IDES (īdz), a term applied by the Romans to the 15th day of March, May, July, and October, and to the 13th of the other months. Cæsar's assassination occurred on the ides of March, on account of which it was an "ater dies," or black day, and on it the senate did not convene.

IDOL (ī'dŏl), an image intended to represent a divinity and as such to be worshiped. One worshiping an image is called an idolator, and the worship idolatry. Various forms of idolatry have been practiced from remote antiquity, the worshipers making greatly diversified things the objects of their worship, such as the sun, moon, stars, the elements, heroes, animals, and various forms of manufactures. The Phœnicians are thought to have originated the worship of heavenly bodies and objects of nature, while to the Egyptians is attributed the origin of animal worship, such as that of the sacred ibis, oxen, and the ichneumon. Hero worship was general in Greece and Rome. The mythology of these peoples deals chiefly with such gods as Zeus, Jupiter, Apollo, Mars, Neptune, and many others. Idol worship has been practiced by many of the Chinese from remote antiquity, and the construction of earthen and other images of human form still prevails among them and other classes. Many of the savages prepare peculiar figures representing animals and human beings, which they adore with feelings of intense devotion. Some writers regard idolatry among the so-called heathen as a degradation of the true God, while others think it is the result of an innate longing common to the human breast through which a knowledge of the true God is sought. It is certain that man is a worshiping being, and activity in this line is common among all peoples, whether it prevails in the worship of one God, in that of idols, the imaginary deities, or the lower forms of fetichism.

IGNATIEFF (ig-nā'te-ĕf), **Nicholas Paulovitch**, soldier and diplomat, born in St. Petersburg, Russia, Jan. 29, 1832. He descended from a prominent military ancestry, secured a liberal education, and served as colonel in the Crimean War. In 1858 he was sent on a special mission to Khiva and Bokhara, was created major-general soon after, and in 1860 appointed ambassador to Pekin. He became minister at Constantinople in 1864, and during his administration secured an enlargement of Russian influence in the Ottoman Empire, while at the same time winning the favor of Christian subjects of the Porte. He was succeeded by Prince Lobanoff in 1878, dismissed from service in 1882 as minister of the interior for allowing Jewish persecution, but subsequently became governor-general of Irkutsk. Both as a soldier and diplomat he exercised much skill in extending the influence of Russia.

IGNATIUS (ĭg-nā'shĭ-us), **Saint**, bishop of Antioch, surnamed Theophorus, one of the apostolic fathers. His life is largely unknown, but it is thought that he became bishop in 69 A. D. and that he was a disciple of St. John. He is regarded one of the most pious of early Christians, and it is certain that he taught lessons of great humility. Domitian persecuted the Christians at Antioch, and during all that period Ignatius showed himself a courageous follower of the Master. After a time he was condemned by Trajan to be taken as a prisoner to Rome and devoured by wild beasts, his death occurring about 110 A. D. He wrote a number of works on Christianity, including epistles to the Romans and Ephesians.

IGNEOUS (ĭg-nē'ŭs), the term applied in geology to rock formed by the action of heat intense enough to produce fusion, including such as basalt, lava, and granite. This class of rock occurs with formations of different geological ages, on account of being forced up from below the surface. They prevail in an unstratified condition.

IGNIS FATUUS (ĭg'nĭs făt'ū-ŭs), a Latin term applied to a luminous appearance in the atmosphere a few feet above the ground in marshes, burial grounds, and other places where there is vegetable or animal matter in a state of decay. It appears to

recede when approached. The cause is thought to be the escape of gaseous substances liberated from decaying bodies, which ignite spontaneously by a union of different forms of gases. Common names applied to this phenomenon are Jack-o'-lantern and Will-o'-the-wisp. The best examples of it are found in the marshes of Ireland and the low region of Germany near the North Sea.

IGUANA (ĭ-gwä'nȧ), a genus of lizards native to tropical America, including about a hundred species. The common iguana is

IGUANA.

from two to five feet long, and mostly of a greenish color. Natives consider the flesh edible, but it is not particularly wholesome. The female lays from four to six eggs in the sand, where they are incubated by the sun. They are hunted by the natives and form a wholesome food. In the adults the claws are sharp, enabling them to crawl on trees. They paddle through the water with a rapid, serpentine movement, being aided by the long, flat tail. They feed largely on vegetable substances, such as fruits, fungi, and tender plants. The spiny agama, an allied animal about seven inches long, is native to South Africa.

IGUANODON (ĭ-gwä'nō-dŏn), an extinct lizard of immense size, so called from the similarity of its teeth to those of the iguana. Fossil remains indicate that the fore feet were comparatively small and the hinder ones large. While walking the animal moved largely on its hind legs. Fossil remains have been found in the British Isles and other European countries, and from them it is held that the animal was between twenty and forty feet long.

ILIAD. See **Homer.**

ILLIMANI (ēl-yē-mä'nē), **Mount,** a lofty peak of the Andes, situated in Bolivia, about forty miles southeast of La Pas. Its height is 21,140 feet above sea-level. In its vicinity are rich deposits of minerals and fine forests.

ILLINOIS (ĭl-lĭ-noi'), a central state of the United States. It has an area of 56,650 square miles, being about as large as the two states of Pennsylvania and Maryland. Its northern boundary is formed by Wisconsin; eastern by Lake Michigan, Indiana, and Kentucky; and southern and western by Kentucky, Missouri, and Iowa. The length from north to south is 375 miles and the greatest breadth 212 miles. It is popularly known as the Prairie or Sucker State. The surface is largely a gently undulating plain, containing practically no waste lands, and constituting an extensive fertile area. Belts of timber skirt the streams and bluffs, and artificial groves and orchards abound in every section. The drainage is exclusively toward the south into the Ohio and Mississippi rivers, two streams forming a large portion of the boundary. Among the principal rivers are the Rock, Fox, Des Plaines, Illinois, Kankakee, Sangamon, Kaskaskia, Embarras, Little Wabash, and the Wabash. The Wabash forms a part of the eastern boundary, receiving the waters from the Embarras and the Little Wabash. There are no lakes in the state except Peoria Lake, a widening of the Illinois River, and Lake Pichtaka in the northeastern part. The Chicago River formerly discharged into Lake Michigan, but the construction of the Chicago Drainage Canal connected it with the Mississippi River system.

The climatic conditions are temperate, the summers being pleasant and marked by cooling breezes, while the winters are moderate, though the thermometer occasionally falls below zero. Great fertility of the soil causes it to rank among the most important cereal, stock, and dairy producing states in the Union. All the cereals common to the central-west grow in its soil, of which corn, wheat, rye, oats, and barley are the most important. The hay production is likewise extensive, as also is the yield of all kinds of vegetables and many varieties of fruits, such as apples, cherries, plums, peaches, apricots, pears, strawberries, raspberries, and quinces. There are large interests in stock-raising, particularly horses, cattle, mules, swine, and sheep. The value of the annual production of corn is placed at about $85,500,000; hay, $20,000,000; oats, $29,750,000; wheat, $9,800,000, and potatoes, $6,500,000. Various manufactures have advanced rapidly. Indeed, it is one of the leading manufacturing states, the capital invested being about $600,000,000, and the annual output valued at $1,000,000,000. Among the chief manufactures are machinery, packed meat, fabrics, railroad engines and cars, watches, bicycles, vehicles, utensils, and other standard articles of commerce. There are also extensive interests in the publishing of books and periodicals, especially in Chicago. The minerals include copper, coal, salt, limestone, and lead. In the production of coal Illinois takes second rank among the states. The coal area includes fully 45,000 square miles, and the annual output is 24,500,000 tons, which represents a value of $20,500,000. The manufactured products of breweries and distilleries are likewise enormous, the latter

being annually about 80,000,000 gallons, and the total production of fermented drinks fully 3,875,000 barrels. Its railroad facilities are the most important of the central-west, and include some of the finest and most extensive lines in the world. The state has about 11,500 miles of railroads; these belong to many different companies and represent a capital of $2,500,000,000.

The educational institutions of Illinois take very high rank, and include some of the finest schools of America. The entire public system is under the supervision of a state superintendent, in which he has the coöperation of county and city superintendents. District and high schools are maintained in all sections, and are supplemented by numerous secondary schools, colleges, normal schools, and universities. The state has five normal schools for the higher training of teachers. However, these are supplemented by other institutions sufficiently extensive to give the state an adequate professional teaching force. The number of colleges and universities in the state is about thirty-five, all of which carry representative courses of study, and have liberal patronage and efficient corps of instructors. Among them may be named the Northwestern University, at Evanston; Illinois Wesleyan University, Bloomington; University of Chicago, Chicago; Lincoln University, Lincoln; Augustana College, Rock Island; Monmouth College, Monmouth; St. Ignatius College, Chicago; Northwestern College, Naperville; Knox College, Galesburg; Northern Illinois College, Fulton; Chaddock College, Quincy; Blackburn University, Carlinville; and Illinois College, Jacksonville. Its five state normal schools are located in the cities of Carbondale, Dekalb, Macomb, Normal, and Charleston.

The state has not only provided amply for all educational interests, but, besides its normal schools, maintains institutions for the care of the blind, deaf and dumb, insane, and feeble-minded. It has amply-equipped reformatory and penal institutions. Several hospitals and homes are maintained for the care of soldiers' orphans, and for the soldiers and sailors of the wars. A large number of scientific and educational societies are in a flourishing condition, and an adequate number of periodicals circulate extensively. The total number of periodicals is 1,850, of which number 190 are dailies, 1,200 weeklies, and the others divided among monthlies, semi-monthlies, and quarterlies. There are 7,500 church buildings, representing a value of $45,000,000, and distributed generally among the different representative denominations, but mostly largely representing the Methodist Episcopal, Lutheran, Baptist, Roman Catholic, Disciples of Christ, Presbyterian, and Episcopalian denominations. The United Brethren and Congregational sects likewise have a large membership.

Illinois was first visited by white men in 1673, when Louis Joliet and Father Marquette ascended the Illinois River, and by way of the Des Plaines and Chicago rivers reached Lake Michigan. In 1680 La Salle and several companions erected Fort Crevecœur on the Illinois River, and Catholic missions were established about the same time. The region came under English dominion by the conquest of Canada in 1673, and after the Revolutionary War it was included with the Northwest Territory. In 1809 it was erected into a territory comprising the present states of Illinois, Wisconsin, Minnesota, and part of Michigan. It was admitted as a state in 1818. The Black Hawk War of 1832 terminated in the removal of all the Indians to regions farther west. Congress made appropriations for the improvement of the Chicago River in 1834. In 1840 the Mormon excitement occurred. That class of Christians moved from Missouri to Nauvoo, Illinois, and four years later Joseph and Hiram Smith were confined in the jail at Carthage and there murdered. Subsequently about 20,000 emigrated under the leadership of Brigham Young and settled in Utah. The state furnished a large number of men for the Mexican War, and 260,000 soldiers supported the Union cause in the Civil War. It has made rapid strides of advancement in wealth, commerce, education, and influence in the national government.

Springfield is the capital of the state. Other important cities are Chicago, Peoria, Quincy, Rockford, Bloomington, Aurora, Elgin, Galesburg, Belleville, Decatur, Rock Island, East St. Louis, Jacksonville, Danville, Moline, Alton, Cairo, Streator, and Freeport. In 1900 Illinois took the third rank in population among the states, being exceeded only by New York and Pennsylvania. Its population, according to the census of that year, is 4,821,550. This number includes 86,677, or 1.8 per cent., colored inhabitants, of whom 85,078 are Negroes. There are 966,747 persons of foreign birth in the state, while 51 per cent. of the entire population reside in the cities, this being due largely to the rapid growth of Chicago.

ILLINOIS, University of, an educational institution situated between Champaign and Urbana, Illinois. It was established in 1867 under special acts of the legislature. The property is valued at $1,750,000, and there is an annual income of about $500,000. Courses are maintained in agriculture, horticulture, architecture, engineering, natural sciences, classics, literature, and military sciences. There are 220 professors and instructors, 2,100 students, and a library of 58,000 volumes.

ILLINOIS INDIANS, a family allied to the Dakotahs, who formerly inhabited Illinois and tracts west of the Mississippi. They were classed with the Algonquins, constituted a brave race, and were identified with the French in their wars against

various Indians, especially the Sacs and Foxes. They now occupy a small reservation in Indian Territory and have taken kindly to the arts of peace and education.

ILLINOIS RIVER, the most important river of Illinois. It is formed in Grundy county by the Kankakee and Des Plaines rivers, receives the Fox and Sangamon, and after a course of about 500 miles joins the Mississippi fifteen miles above Alton. Formerly it was navigable only to Peru, a distance of 250 miles, but it is now serviceable for vessels to points farther up by reason of its receiving the water of the Chicago Drainage Canal, which enters the Illinois River through the Des Plaines.

IMAGINATION (ĭm-ăj'ĭ-nā'shŭn), that faculty of the mind by which it receives concepts of absent objects, not as they are or were, but as they might be. The original material with which it builds is derived through memory by sense-perception, and thus imagination is created in a limited sense. The material secured in this way is used with modification, or it may be modified and then used, and thus new images or mental pictures are created that differ from any product that memory gives. In the combining of images, or the formation of new ones, the laws of the association of ideas govern the operation, but imagination is governed at least partially by the will, for by it the thoughts are controlled to some extent and the limits are determined within which the laws of association are to act. The products of imagination are termed according to the results, as phantasmal, fanciful, artistic, and inventive. Imagination makes possible the culture of fine arts, gives vividness and force to language, lightens life's burdens, and leads to the attainment of success in the practical affairs of life. Its culture is important, since it may serve a good or evil purpose, this depending upon its early and right training.

IMMORTALITY (ĭm-mŏr-tăl'ĭ-tȳ), the term employed to designate the endless life of the soul. In theology it is applied to the eternal, personal, and conscious existence and union with God. Belief in the immortality of the soul is very ancient, and implies a continuation of our personality, or consciousness, and of the will. The most rude people hold views regarding a future state, one in which the arts of this life will be pursued with even greater satisfaction than the present existence affords; a state in which nature and the chase will yield enlarged gratifications. Among the ancient Egyptians the idea of immortality led to a belief in a dwelling-place of the dead and of a future judgment. Their beneficent god Osiris judged the departed, and "having weighed their hearts in the scales of justice, he sends the wicked to the regions of darkness, while the just are sent to the god of light." Among the early Grecians a belief was prevalent that the departed passed into the realms of light or hades, the place for the dead. Thus we read of Achilles, the ideal hero, that he declared he would rather till the soil than live in pale Elysium. Socrates discourses on the doctrine of immortality in the "Apology" and the "Phaedo," and concludes that the soul is the immaterial and superior part, and is not dispersed into nothingness when separated from the body. He thought that to study how to die calmly is true philosophy, and that the soul spends the rest of its existence with the gods, freed from the evils of humanity. The Christian religion teaches the immortality of the soul, as do also other religions, and some Christians and others hold to the belief in a state where purification of the soul takes place after death. Man is taught by reason and religion to strive for continued perfection, and that the truthful and rightful will not pass unrewarded.

IMMORTELLES (ĭm-mŏr-tĕlz'), or **Everlasting Flowers**, a term applied to a class of flowers that do not lose their color or beauty in drying. They are native to northern Africa and western Asia, and are cultivated extensively in gardens and greenhouses. The name immortelles was compounded in France, where they are grown extensively and used in making wreaths. In many countries wreaths made of immortelles are placed on graves to symbolize immortality.

IMPEACHMENT (ĭm-pēch'mẹnt), the calling into question of the motives of an individual or of the validity of the law. It is applied particularly to the accusation and prosecution of an officer for mal-administration, by a legislative body. In the United States the constitution vests the right of impeachment exclusively in the house of representatives, and the right of trial in the senate. The officers liable to impeachment are the president, vice-president, and all civil officers of the United States, and the causes include treason, bribery, and other high crimes and misdemeanors. In the trial by the senate the regular officer presides, but when the president is impeached the chief justice of the supreme court is the presiding officer. A two-thirds vote of the senators present is necessary for conviction. Punishment extends only to removal and disqualification to hold any office under the constitution of the United States, but the offender is still liable to an ordinary trial by law. Impeachments of state officers are provided for by the constitutions of the various states. In the United States seven federal officers have been impeached, two of whom were convicted. The number embrace Senator William Blunt of Tennessee, in 1797; District Judge John Pickering of New Hampshire, 1803; Supreme Judge Samuel Chase of Maryland, 1804; District Judge James H. Peck of Missouri, 1830; District Judge West H. Humphreys of Tennessee, 1862; President Andrew Johnson, 1868; and

Secretary of War William R. Belknap, 1876. The only convictions secured were in the trials of John Pickering and West H. Humphreys.

IMPERIALISM (ĭm-pē′rĭ-*a*l-ĭzm), the policy of territorial extension by conquest, the spirit of empire, or the system of government under an emperor or empress. The term is used in France to designate the revival of the Napoleonic empire, and in England to a policy of territorial extension. In the presidential campaign of 1900 in the United States the term was employed largely for the purpose of designating the policy of the national administration in dealing with the Philippine Islands.

IMPRESSMENT (ĭm-prĕs′ment), the act of impressing into the public service, or of seizing property for public use. Formerly the power of impressment was claimed by many governments, but since the War of 1812 it has been abandoned by most countries. The British government claimed the right of searching American vessels prior to the War of 1812, and of impressing into service British seamen serving under the American flag. At that time England was at war with France and claimed services of all her maritime citizens, refusing to recognize allegiance to the United States even by naturalization. The willful impressment of many American sailors was instrumental in bringing about the embargo system and the War of 1812.

INCENSE (ĭn′sĕns), an aromatic substance that emits a sweet odor when burned, and used from remote times in religious rites. The substance employed consisted anciently of a mixture of gums, spices, and balsams, which form a large portion of the ingredients still used. Among the Jews incense was burned on a special altar, called the altar of incense. They employed it only as an act of worship and not as a sacred offering. The worshiping of gods in ancient Assyria, Babylonia, Egypt, India, Greece, and Rome included incense-burning daily, a practice usually performed in the morning and evening. It is still employed by the adherents of divers religions of Asia, especially by the Buddhists. The Greek and Roman churches both employ incense in worship, especially in the most sacred services, such as high mass, in funerals, and the consecration of churches.

INCOME TAX, a tax levied upon the annual income of individuals, investments, and corporations. This form of taxation has been levied more or less extensively since mediæval times. In 1646 the first income tax levied in America went into effect under the direction of the Massachusetts Bay Colony. Massachusetts has maintained a tax of this character during most of its history. It and a few other states still impose this class of taxes. In Great Britain the first income tax of modern times was levied in 1799, a form of taxation still existing in that country. The first income tax imposed by the United States went into effect in 1861, when a tax of 3 per cent. was levied on incomes of $800 per annum and over, and the following year congress imposed an income tax of 3 per cent. upon the excess of incomes above $600 to $10,000, and 5 per cent. on the excess above $10,000. The graduated scale was somewhat revised in 1864 and in 1867, and in 1872 the law was repealed. From the available statistics it is learned that the taxes collected under these laws were as follows:

1863	$ 2,741,858	1868	$41,455,598
1864	20,294,732	1869	34,791,856
1865	32,050,017	1870	37,775,874
1866	72,982,159	1871	19,162,651
1867	66,014,429	1872	14,436,862

The total amount derived from the income tax, including some arrears, was $346,911,760.48. In 1894 congress imposed an income tax of 2 per cent. upon the excess of all incomes above $4,000 per annum, and included all corporations, companies, and associations other than partnerships. On May 20, 1895, the law was declared unconstitutional and void by the supreme court of the United States. Since the tariff reduction effected by the same law that included the income tax did not provide sufficient revenue aside from that of the income tax, a deficit in the funds of the nation was created. Much criticism has been made of the court on account of rendering this decision.

INCUBATION (ĭn-kū-bā′shŭn). See **Egg**.

INDEPENDENCE (ĭn-dē-pĕn′dens), county seat of Buchanan county, Iowa, on the Wapsipinicon River. There are good connections by railroad. The surrounding country is farming and dairying. It has an excellent high school and is the seat of the state hospital for the insane. Among the facilities are a public library, electric street railways, waterworks, and street lighting. Population, 1900, 3,656.

INDEPENDENCE, a city in Missouri, county seat of Jackson county, ten miles east of Kansas City. It has extensive railroad connections, good schools, and is the seat of the Kansas City Ladies' College, Woodland College, and several other important institutions. The surrounding country is agricultural and fruit-growing. There are manufactures of flour, woolen goods, ironware, and machinery. Pavements, street lighting, waterworks, and other improvements are among the municipal facilities. Population, 1900, 6,974.

INDIA (ĭn′dĭ-ạ), a dependency of Great Britain in South Asia, including the regions of Hither and Farther India. Its total area is 1,560,253 square miles, of which 1,068,314 square miles are included in India proper. The population of the entire region is 294,500,000, but this number includes 66,500,000 resident in the feudatory states. India occupies the extensive central peninsula extending into the Indian Ocean between the Bay of Bengal and the Arabian Sea. It is tri-

angular in form, and is separated from the rest of Asia by the great ranges of the Himalayas, Hindu-Kush, and Suleiman mountains. The surface is naturally separated into three vast regions. In the southern portion is the Great Deccan, with a general elevation of from 1,800 to 3,000 feet; north of it the Great Plain, which is the most fertile and populous region; and the elevated region of the Himalayas.

The Himalaya Mountains are the most lofty in the world, many of the peaks rising to heights of from twenty to thirty thousand feet above sea-level. They include vast regions perpetually under snow. The valleys of the Ganges and the Indus rivers are particularly fertile, but extensive coast plains and interior valleys likewise possess fertility. Among the principal streams are the Ganges, Indus, Brahmaputra, Jumna, Ghara, Mahanadi, Godavari, and Kistna rivers. The coast indentations are few, the number of natural harbors limited, and the only lakes are Kolair and Chilka, near the eastern coast. In most parts of India the climate is tropical, with two distinctive periods, the rainy season and the dry season. The rainy season continues from November to March, and the dry from May to November, but the distribution of humidity is more or less irregular, on account of which droughts are not infrequent. In the summer, or dry season, the heat is very great, though the climate is generally healthful and diversified extensively on account of various elevations, and the influence of monsoons reaching the continent from the Indian Ocean.

Agriculture is the principal occupation, nearly 200,000,000 people being directly dependent upon that industry. Among the chief crops are rice, wheat, rye, cotton, sugar cane, tobacco, tea, oil-seed, opium, jute, and indigo. The production of vegetables and many varieties of tropical fruits is also important. Domestic animals common to Europe are reared, besides camels, buffaloes, and a limited number of elephants. The wild animals embrace the leopard, hyena, jackal, tiger, deer, wild ass, bison, large varieties of snakes and reptiles, and many species of birds common to tropical and temperate climates. Many varieties of fish are common to the streams and the coast waters. Forests are abundant and yield valuable varieties for manufactures, among them the teak forests, which are of great economic value and are under government protection. The timbered districts also include regions in which the banyan, bamboo, saul, sappan, and other valuable products abound. There is vast mineral wealth and the mining industry yields large returns. The products include all classes of metals and other minerals, but the production of coal, iron, salt, petroleum, and copper have received the largest share of attention. Manufacturing is of next importance to agriculture, and involves the production of woolen, cotton, silk, and jute goods. There are also productions of farming utensils, machinery, clothing, ivory, earthenware, precious metals, opium, gunny-bags, indigo, and leather.

The interior trade of India has been largely developed through modern conveniences. Numerous irrigation canals have greatly enlarged the tillable area, but the regions having sufficient rainfall include some of the most extensive farming districts in the world. Ship canals are also abundant, which, with the river navigation, facilitate extensive commercial operations. The total railroad lines include about 30,000 miles; these represent a capital of $1,200,000,000, and penetrate into all the more productive agricultural and mining districts. Telephone, telegraph, and postal connections are likewise extensive, and are administered with a marked degree of efficiency.

The Hinduish language is spoken by 85 per cent. of the population, and embraces the most important of the Indian group. Aside from the European languages, which are spoken only to a very limited extent, there are about seventy-five languages, but none of these, aside from the Hindu, is spoken extensively. About 100,000 of the people are of British origin. The number of Christians is estimated at about 2,200,000. The Mohammedans number 60,000,000; the Animistics, 10,000,000, and the Buddhists, 7,500,000. Brahmanism is the religion of a vast number of the people, being that of the Hindus proper, and numbers fully 210,000,000 adherents. Schools and colleges are maintained liberally by public grants, but the male population has taken advantage of educational facilities more extensively than the female. The school attendance is about 6,500,000, of which only one-sixth are girls. Colleges and seminaries are maintained in the larger cities and there are five universities, one each in Madras, Calcutta, Punjab, Bombay, and Allahabad. There are also many missionary schools and institutes maintained by foreign missionary societies, all of which have an influence educationally for the betterment of social and religious conditions.

The government is administered by the secretary of state for India, who is a member of the British cabinet and has the assistance of a council of fifteen. Executive authority is vested in a viceroy who resides in India, and receives his appointment by the crown under the approval of the secretary of state for India. A council of six members appointed by the crown assists the viceroy, and also the commander-in-chief of each executive department. A legislative council, consisting of the members of the executive council, together with from ten to sixteen members nominated by the viceroy, constitute the legislative authority for local purposes. Formerly British India was divided into three presidencies, namely,

Bombay, Bengal, and Madras, but these have largely lost their meaning by the division of the Bengal presidency into local governments.

At present there are thirteen administrations, either under the governors, lieutenant-governors, or commissioners, and comprise the following: Madras, Bengal, Bombay, Punjab, Burmah, Oude, Assam, Berar, Ajmere Merwara, Coorg, British Baluchistan, the Andaman Islands, and the Northwest Provinces. The government of the different divisions varies somewhat in administration, but all are more or less under control of the Indian government and responsible to the viceroy. High courts of justice are situated in Madras, Bombay, Bengal, and the Northwest Provinces, from which appeal can be taken to the privy council. Inferior courts are maintained in the subordinate divisions, from which appeals may be taken to the high courts. The entire army of India proper is 210,000, and including that of the feudatory states about 350,000, all of which are officered by Europeans. The king of England is emperor of India. There is a total public indebtedness of $960,500,000.

The history of India begins with legends and sketches from Sanskrit literature. The first authentic facts come to us from about the year 2,000 B. C., when the original inhabitants were subdued by the Aryans, a people of much advancement in civilization and industrial arts, who inhabited the regions in the northwestern part of India. In 518 B.C. a Persian army under Darius invaded India, and in 327 Alexander the Great led an expedition to the Indus. Buddhism was established in the 3d century B. C., but it yielded almost entirely to Brahmanism in the several succeeding centuries. The Mohammedans invaded India in 711 A. D., and in 1001 the entire country was occupied by them, under Mahmud of Ghazni. Powerful invasions occurred under Genghis Khan in the 13th century; under Timour, or Tamerlane, in the 15th century, and in 1525 the Mogul Empire was established by Sultan Baber. From 1556 to 1607 Akbar, grandson of Baber, reigned successfully and extended the boundaries so as to include almost the entire peninsula in his dominion, his government being the most important experienced under the Indian sovereigns. After his death the empire became divided and Europeans began to manifest an interest in Indian riches. Travelers, traders, and missionaries of various European nations frequented India in the beginning of the 16th century, and about the same time the Portuguese established fortresses and trading posts on the Malabar coast, and soon after obtained control of the ports of Persia, India, and the adjacent islands.

The Dutch established a foothold in India in 1595 and carried on important trade relations with interior river points. In 1613 the British East India Company formed a settlement at Surat, and later obtained territory at Madras and Calcutta. The French founded settlements about the same time, giving rise to conflicting claims, and in 1746 a war occurred in which the French won Madras, but later restored it by the treaty of Aix-la-Chapelle. The Deccan and Carnatic were under the influence of the French governor, Dupleix, at Pondicherry in 1751, and soon a second war resulted, after which Carnatic fell into the hands of the British, and in 1757 Clive won Bengal by a victory over the Moguls at the battle of Plassey. Charters were granted to a company soon after, which were renewed successively, and at each renewal more control became vested in the home government. In 1838 an effort to establish a British protectorate over Afghanistan failed, and an Indian mutiny occurred in 1857, in which British residents at Cawnpore and other localities were massacred. However, Queen Victoria had already assumed the government of all the territories of India in 1855, and by 1858 order was restored and vast internal improvements in canal and railroad building were carried forward. In 1877 Victoria assumed the title of empress of India. Wars with Afghanistan and Upper Burmah occurred in 1878 and 1884, and the latter was annexed in 1886. Among the more important events of recent years are the plague in the year 1897, in which 250,000 perished; the appointment of Lord Curzon of Kedleston as governor-general in 1898, and a widespread famine in 1900. The export and import trade is very extensive, the United States being one of the principal nations carrying on trade relations. Other nations taking high rank in Indian commerce include Great Britain, Germany, Austria, France, Russia, Japan, and China. However, about 65 per cent of the foreign trade is with the United Kingdom.

INDIA INK. See Ink.

INDIANA (ĭn-dĭ-ăn′ą), an east central state of the United States, bounded on the north by Michigan and Lake Michigan, east by Ohio, south by Kentucky, and west by Illinois. It has a length from north to south of 275 miles; breadth 140 miles, and area 36,350 square miles, about as large as Maine, Rhode Island, and Delaware. The surface is an undulating plain, sloping toward the southwest, with an annual rainfall of about forty-two inches and a temperature of 52° Fahr. Among the principal rivers are the Wabash, White, and Kankakee; all of which belong to the Mississippi system. In the northern part of the state is the St. Joseph River, and in the northeastern the St. Josephs and St. Marys. Most of the rivers and smaller streams are skirted by valuable belts of heavy timber, and forests also occur more or less in different regions of the state. The soil generally is fertile and well adapted to the production of agricultural products, but there are tracts more or less sandy in the vicinity of Lake Michigan.

Among the chief crops are corn, wheat, rye, barley, buckwheat, flax-seed, hay, tobacco, vegetables, and many varieties of fruits common to the temperate climates. The mineral wealth comprises coal, limestone, iron, gold, ocher, mineral oils, and natural gas. There is a coal area of about 7,000 square miles, and the annual output is placed at 5,000,000 tons. As a coal-producing state it takes sixth rank. The manufactures of distilled and fermented liquors, oleomargarine, cigars, machinery, farming utensils, and ironware are among the most important. Indianapolis is a center for pork-packing, about 1,150,000 hogs being marketed there per year. The value of corn produced annually is $38,500,000; wheat, $6,500,000; oats, $9,150,000; potatoes, $4,000,000; and hay, $16,200,000. There are large interests in the production of horses, cattle, mules, sheep, and swine. Dairying is a growing industry; the products, including milk, butter, and cheese, find a ready market in Chicago, Indianapolis, Cleveland, and Cincinnati.

The railroad mileage of the state is about 7,000, giving all the counties a ready outlet to market. There are also extensive transportation facilities on the Ohio River, forming the southern boundary, and on Lake Michigan, which has a coast line of fifty miles in the state. Besides, there are about 300 miles of additional navigation facilities on the Wabash River. The state is divided into ninety-two counties, all of which have transportation facilities, either by railways or rivers, and thriving towns. Indianapolis is the capital and largest city. Other cities of importance include Evansville, Fort Wayne, Terre Haute, New Albany, Lafayette, South Bend, Richmond, Logansport, Jeffersonville, Elkhart, and Michigan City.

An efficient system of public instruction is maintained, which is under the general supervision of a state superintendent. The common schools are equipped with adequate courses of study, and supplemented by a well organized system of higher schools, colleges, and universities. The Indiana University is situated at Bloomington, and three normal schools are maintained for the education of teachers. There are state prisons at Jeffersonville and Michigan City. The state also maintains adequate institutions for teaching agriculture and industrial arts, and provides amply for the unfortunates and others usually under state care. There are excellent high schools with extensive courses in the larger cities. The prominent institutions in the state not already named include the Northern Indiana Normal School, at Valparaiso; De Pauw University, Greencastle; Concordia College, Fort Wayne; Hanover College, Hanover; Butler College, Irvington; University of Notre Dame, Notre Dame; Franklin College, Franklin; Earlham College, Richmond, and Taylor University, Upland. Besides those named are many others carrying college and university courses, and several business colleges and scientific societies. There are 900 periodicals, of which 150 are issued daily, 650 weekly, and the others published at less frequent periods. They represent all phases of intelligence, and the different classes of educational and scientific interests.

Indiana is popularly called the Hoosier State. It was formed from the Northwest Territory. In 1800 the territory of Indiana was separated from Ohio; Michigan territory was cut off in 1805; Illinois territory in 1809, and what remained was admitted as a state in 1816. The first settlement was made at Vincennes, on the Wabash, in 1702 by the French under La Salle. Indian wars occurred at various times, but the success of General Harrison at Tippecanoe in 1811 terminated the more important conflicts. The center of population of the United States was calculated by the census of 1890 at a point southwest of Greensburgh, the county seat of Decatur county, twenty miles east of Columbus. Ten years later, in 1900, the center of population of the United States was is southern Indiana, about six miles southeast of Columbus, the county seat of Bartholomew county. Its total population is 2,516,462. This includes 57,960 colored inhabitants, or 2.3 per cent., of whom 57,505 are Negroes and 243 Indians.

INDIANAPOLIS (ĭn-dĭ-ăn-ăp'o-lĭs), capital and largest city of Indiana, situated on the White River, and noted for its extensive railroad connections and manufactures. It is equipped with all modern municipal facilities, has beautiful streets, and during the last decade has enjoyed remarkable growth and prosperity. The manufactures represent a capital of $16,500,000, employ 16,500 persons, and include among the products sewing-machines, railroad cars, cotton and woolen goods, pianos, vehicles, packed pork, machinery, flour, and furniture. There are many grain elevators, and stock-yards covering an area of twelve acres, at which about 1,200,000 head of stock are received annually. The public school system has a national reputation, and, besides it, there are several higher and professional institutions of learning. It has a fine state capitol and other state and county buildings. The business of the clearing house aggregates annually $225,000,000. There is an extensive street railway system, which penetrates all parts of the city and adjacent districts. The city also has fine residences and churches, substantial pavements, gas and electric lights, public parks, and several excellent libraries. It ranks as the twenty-first in population, which in 1890 was 105,436, and in 1900, 169,164.

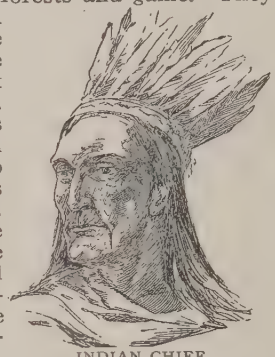
INDIAN ARCHIPELAGO, or **Malay Archipelago**, the most extensive group of islands in the world, situated southeast of Asia, and washed on the east by the Pacific Ocean and on the west by the Indian. The

group lies between parallels 11° S. and 17° N.; and between the meridians 95° and 140° E. It includes some of the most extensive and valuable islands in the world and comprises three principal groups: one including Sumatra, Java, and the Sunda islands; another the Philippines, Molucca, and the Spice islands; and the third group, the Celebes, Borneo, and several others. There are grouped with each of the divisions innumerable smaller islands, all of which have a soil more or less fertile and abound in luxuriant vegetation. The products are largely tropical, such as coffee, sugar, rice, tea, indigo, opium, gum-elastic, rattan, and ivory. Valuable minerals and timber are abundant. Many of the islands contain volcanoes and are of volcanic origin. Holland has the most extensive possessions, its dominion being usually termed Dutch East Indies. The Malayan is the principal of the native races.

INDIAN CORN. See **Corn.**

INDIAN OCEAN, the third in size of the five great oceans. It lies south of Asia, west of the Sunda isles and Australia, north of the Antarctic Ocean, and east of Africa. A line drawn from the southern extremity of Tasmania to the Cape of Good Hope is its southern boundary, from which it gradually narrows toward the north. India divides it into the Bay of Bengal and the Arabian Sea, and from the latter the Persian Gulf and the Red Sea branch toward the northwest. Its length from north to south is about 6,500 miles, and breadth from 4,000 to 6,000 miles. The equator passes through it, along which the equatorial current passes from east to west. Its navigation is influenced by periodic monsoons and trade-winds. The principal rivers flowing into it include the Zambezi from Africa, the Ganges, Indus, Tigris, Euphrates, and Irrawaddy from Asia, and the Ashburton, Gascoure, and Murchison from Australia. Ceylon and Madagascar are the only large islands, though there are many small islands widely distributed, and several important groups of islets. Its depth is greatest near the coast of Asia, in the Arabian Sea and the Bay of Bengal. The greatest depth in the former is 15,000 feet and in the latter about 13,500 feet. Its depth near the southeastern coast of Africa ranges from 7,500 to 12,000 feet.

INDIANS, American, the collective name applied to the people found in America when it was discovered by Columbus. The name originated from the idea that the continent discovered formed a part of India, and that these people were only a part of the great populations of southern Asia. However, they generally called themselves Onkwe Honwe, meaning men. There were probably about 265,000 Indians in the territory comprising the United States at the time America was discovered, which is about the total number at the present time. There were Indians in all parts of America, both in the regions of British America and those south of the United States, including South America, but their number in any given section depended upon the existence of forests and game. They lived in tribes and clans. All were members of one great family, but they ranged from the rudest savages to the cultivated Aztecs of Mexico and the Peruvians of South America. In the extreme north were the Eskimos, who still occupy the northern part of the British possessions. Those formerly dwelling in the vast regions south of the Eskimo possessions have been widely diversified by intermarriage and scattered from the regions they formerly occupied. The tribes occupying the northern portion of the United States were classed either with the Algonquin or Iroquois races, while in the southern portions were the Mobilians and the Natchez. The Aztecs occupied large portions of Mexico and Central America, but in these regions were also the Otomis, Maya, and the Quiches Indians. The Peruvians of South America were advanced in civilized arts quite as much as the Aztecs, and included the Inca and the Aymaras races. In Chile were the Araucanians, on the Atlantic slope the Guaranis, on the northern coast the Caribs, who also occupied most of the West Indian islands, and in the extreme south lived the tall Patagonians.

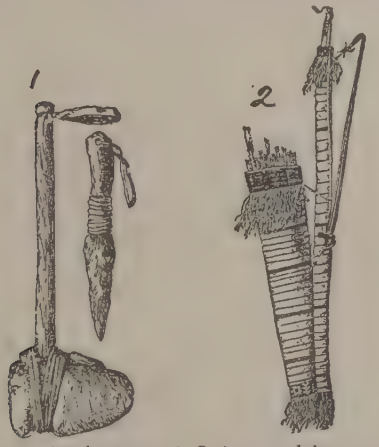


INDIAN CHIEF.

The Algonquins and Iroquois included many branches, but these two great families were continually at war with each other for supremacy, and later offered formidable resistance to the onward march of the Europeans. Hostilities of note first occurred in Virginia in 1622, and these were followed by engagements in New England in 1637. The Indian wars waged between 1790 and 1795 against the Miami Confederation in Ohio were the most destructive of human life, but General Wayne dealt a crushing defeat to them in 1793. The success of General Harrison at Tippecanoe, in 1811, checked them materially, but in the following year the Indians became allied with the British, and were again defeated by Harrison in 1813 at the Thames, when Tecumseh was killed. General Jackson in the same year conducted operations against the Creeks in the south and defeated them at Talladega and the Horse Shoe Bend of the Tallapoosa River. He likewise defeated the Seminoles in Georgia and Alabama in 1817, and on the same expedition executed two Englishmen, Arbuthnot and Ambrister, after conviction

by court-martial on a charge of inciting the Indians to cause disturbances. The last battle with the Indians taking rank as a severe contest occurred on the Little Big Horn River, near the Black Hills, in 1876, when General Custer was slain.

Government among the Indians was loosely administered, and, though confederations were formed among the tribes, they were not of long duration. Their occupations were principally hunting and fishing, and those in the United States dwelt largely in tents and other perishable buildings. Some tribes developed skill in the culture of corn, beans, and tobacco, and the more highly civilized of Mexico and Peru were considerable advanced in civilized arts. They built dwellings and cities; constructed aqueducts, canals, and highways; had a recognized form of government, a fixed form of worship, and left to future generations massive pyramids and innumerable mummies. The manufactures of the Indians in



1, Stone implements; 2, Quiver and bow-case.

the United States included bows, arrowheads, pottery, snow-shoes, stone pipes, canoes, baskets, and other articles useful to them in domestic life and in the arts of war. Their dress was largely of the skin of animals, and their food consisted of vegetables, a few cereals, but principally of the wild game then very abundant.

In religion the Indians held that there is a future life, and that the spirit after the death of the body enjoys the happy hunting grounds, but they did not make a distinction as to the influence that the conduct in their present life might have in attaining to happiness beyond. They are sometimes called the red race, from the reddish tint observable in their complexion, which varies from almost white to dark brown. The hair is long and straight, usually black, but sometimes brownish, eyebrows heavy, beard scant, eyes sleepy and dull, lips compressed, and face broad. Some ethnologists think they descended from the Mongolian race, while others regard them a mixture of the Polynesian and Caucasian with the Mongolian. From the tradition of their tribes it is learned that they themselves thought that they emigrated from some region, but knew not from whence. The sun worship of the Incas and Aztecs has been taken to indicate some connection with early Asiatic peoples, while the Eskimos of North America are quite identical with those of Siberia.

The policy of the United States government for some years has been to make citizens of the Indians by giving them every possible encouragement in educational facilities, landed possessions, and financial support. Indian Territory was set apart for the purpose of founding homes and giving to all opportunities to engage successfully in the industries, but there are numerous Indians in other sections of the United States. Of the Indians now in this country, there are 52,500 in Indian Territory, and considerable numbers are in about one-half the states. The number in Arizona is 26,480; Michigan, 6,354; South Dakota, 20,225; Minnesota, 9,182; California, 15,377; Montana, 11,343; Mississippi, 2,203; Oklahoma, 11,945; North Dakota, 6,968; New Mexico, 13,144; New York, 5,257; Nevada, 5,216; Oregon, 4,951; Kansas, 2,130; Nebraska, 3,322; Idaho, 4,226; Utah, 2,623; North Carolina, 5,707; and Alaska, 29,536. There are also considerable numbers in the states of Wisconsin, Washington, and Wyoming. Many of the tribes are hostile to an intermingling with the whites, but others take readily to education and intermarry extensively. Some of the Indians have attained to much educational vigor, broad and liberal views, and have become famous as scholars and educators. Large numbers attend at colleges and universities, and engage in the practice of medicine, law, the publication of newspapers, and all the different civilized arts. The total annual expenditures by the government for schools and all purposes relating to them aggregate $8,850,000. Under certain conditions the Indians are admitted to full citizenship, when they may hold office under the United States, receive full rights of suffrage, and have all privileges and benefits accorded to other citizens. The condition under which these privileges are extended is that they stipulate with the government to waive all claims to public support.

INDIAN TERRITORY, an unorganized territory of the United States, set apart by the government in 1834 for Indian reservations. It is bounded on the north by Kansas, east by Missouri and Arkansas, south by Texas, and west by Oklahoma. The territory has a total area of 31,400 square miles, being about as large as New Hampshire, Vermont, and Maryland. Its surface is an undulating plain, but in the east and south are ranges of the Ozark Mountains, which extend into it from Missouri. They rise to an altitude of 1,200 feet. The general slope

is toward the southeast, and the drainage is entirely into the Mississippi River system. Among the principal rivers are the Arkansas, Canadian, and Red, the latter forming all of the southern boundary. The tributary streams include the Salt, Morsho, and North Fork of the Canadian.

The soil is fertile and the climate well adapted to agriculture. The mean annual temperature is about 60°, and the rainfall is fully adequate to the production of all kinds of crops, except in the western portion, where irrigation is employed to some extent. Forests abound along the rivers and in the eastern portions, while prairies stretch over the southwestern part. Mining is a growing industry, largely producing coal, but other valuable minerals abound in the Ozark ranges, particularly iron, limestone, and the precious metals. The manufactures embrace coke, flour, brick, tobacco, machinery, and utensils. Among the principal agricultural crops are corn, wheat, oats, potatoes, cotton, and sweet potatoes. Fruits of many varieties are produced extensively, especially apples, peaches, pears, plums, quinces, and grapes. The production of horses, cattle, sheep, and hogs is likewise important. Most of the Indians engage principally in agriculture, stock-raising, and wool-growing, while whites who have become members of the tribes control largely the mining interests. At present the annual production of coal aggregates 2,110,000 tons.

Common schools have been established in all sections, and these are supplemented by a number of high schools and a flourishing university at Muscogee. There are also a number of denominational schools and colleges and fully 1,000 church organizations, nearly all of which have houses of worship. Orphan asylums, hospitals, and various charitable and benevolent institutions are maintained. An adequate number of railroad lines penetrate the territory and furnish ample means for the transportation of imports and exports. The different lines now aggregate 1,750 miles. There are five nations, all of which allow Negroes to become members. White men who marry Indian women are classed as members and allowed to hold property. Besides the tracts set apart for the five nations, there are also a number of minor reservations. Postoffices are maintained by the United States government, and the system is managed successfully. There are about ninety-five newspapers, of which ten are daily, eighty weekly, and the others monthly or quarterly.

Indian Territory was secured as a part of the Louisiana Purchase in 1803. The Creeks, Choctaws, Cherokees, and Chickasaws settled there in 1834, and later the Seminoles. In 1890 Oklahoma was detached from the territory and formed into a separate division. The government is by tribes, but a general council exists in which the different tribes are represented by delegates, the number being based upon population. The five capitals of the different nations are: Creek Nation, Okmulgee; Cherokee Nation, Tahlequah; Choctaw Nation, Atoka; Chickasaw Nation, Tishomingo; and Seminole Nation, We-wo-ka. The census of 1900 ennumerates ninety incorporated towns. Six of these have a population of over 2,500. These include Colgate, 2,614; Durant, 2,969; Chickaha, 3,209; South McAlester, 3,479; Muscogee, 4,254; and Ardmore, 5,681. In 1890 the total population was 180,182; in 1900, 391,960. However, only a comparatively small number are Indians. The total colored population is 89,380; of this number 52,500 are Indians and 36,053 Negroes.

INDIAN UNIVERSITY, an institution near Muscogee, Indian Territory. It was founded in 1880 by A. C. Bacone, who became its first president. Since 1885 it has been occupying new quarters and has excellent equipments, among them a well arranged course of study, adequate apparatus, and an extensive library.

INDIA-RUBBER, or **Gum-Elastic**, a soft, flexible, and very elastic substance derived from the milky sap of various tropical plants. There are many different families of plants that yield gummy products. The principal tree yielding juices from which india-rubber is manufactured is tall and possesses an abundance of the fluid. The juice is secured by making incisions in the trunks of the trees, under which receptacles are placed. From ten to twenty-five gallons of the juice is obtained from a single tree in a season, and about two pounds of good rubber is secured from a gallon. The rubber is obtained in a crude form by evaporating the juice in the sun, or in tanks placed over a fire. It may also be coagulated by mixing with it sap from the bejuca vine. The raw material is purified by boiling and subsequently by pressing through powerful machines, after which it is rolled into plates and dried.

The india-rubber of commerce is produced largely in Mexico, Central America, South America, Java, Singapore, Assam, Penang, and South Africa. In 1823 Mackintosh patented a water-proofing process by which india-rubber came largely into use, and its applications now are innumerable. It is now rarely employed in a pure state, but is vulcanized by heating the pure rubber with sulphur. In this way it is hardened and serves many useful purposes, such as for belting, shoes, hose, tires, cloth, combs, bracelets, furniture, paper knives, water packing, life preservers, paving, gas bags, and gloves. The harder products, such as buttons, inkstands, rulers, canes, and artificial teeth are secured from rubber vulcanized under an application of sulphur exposed to a high temperature. In making covering for telegraph wires it is vulcanized with asphalt, sulphur, and oils.

INDIGIRKA (ĭn-dē-gēr'kä), a large river

of eastern Siberia, rises in the Stanovoi Mountains, and after a course of 750 miles flows into the Arctic Ocean. The region traversed by it consists largely of frozen marshes, and the inhabitants support themselves chiefly by the chase.

INDIGO (ĭn'dĭ-gō), a vegetable dyestuff that yields a beautiful and very durable blue dye. It is employed extensively in forming a basis for black dye in woolen goods, for dyeing, and calico-printing. The product is obtained from numerous plants of a shrubby and herbaceous character that thrive in equatorial regions. These plants belong to the order of leguminosæ, of which the indigofera tinctoria is a genus. The plants are from two to six feet tall, have rounded leaves, and blue, purple, or white pea-shaped flowers. Ordinarily they are classed with the bean family. They are cut when in blossom, which occurs when the plants are about three months old. The seeds are sown early in the spring; the cutting takes place in mid-summer, and after several months a second crop shoots up, and in some localities a third. The indigo market of southern Asia centers largely at Bengal, whence large quantities are exported to the United States. Only from 50 to 60 per cent. of the indigo of commerce is pure indigo blue; the other portion consists of indigo yellow, indigo gluten, indigo red, and other allied substances. From history it is learned that indigo has been produced in India from remote times. It was imported from that country by the Phœnicians, Grecians, and Romans.

INDIGO BIRD, a North American finch, native to the southern part of the United States, Mexico, and Central America. In

INDIGO BIRD.

the summer time it comes north as far as Missouri, where it is captured and domesticated as a cage bird. It is about six inches long, has a greenish-blue color, wing feathers brown, and is black beneath the bill. It nests in the tallest trees and is noted for its beautiful song. The female is somewhat smaller than the male and has a yellowish-brown body with the wings several shades darker.

INDO-CHINA (ĭn'dō chī'nạ), a name frequently applied to the French colonies in the southeastern peninsula of Asia, which lie between the Bay of Bengal on the west and the Gulfs of Siam and Tonquin and the China Sea on the east. The area is estimated at 363,422 square miles, and the population at 22,500,000. These possessions include Anam, Laos, Cambodia, French or Lower Cochin-China, and Tonquin. The name is sometimes applied to the entire peninsula, and when used in that sense includes Burmah. This region contains natural resources of much commercial value, and has been developed under a policy of colonial government. Railroad construction, canals for navigation and irrigation, telegraph and telephone lines, and municipal facilities have received aid from the French government. The exports and imports are alike extensive. Among the chief imports are machinery, woolen goods, cotton products, and various manufactured articles. The exports embrace principally rice, raw hides, pepper, volatile oil, copra, cocoa, and many varieties of fruits. Mining has developed in copper, coal, tin, iron, and zinc. There are productions of gas and mineral oils. The region is well watered by the Menam and Mekong rivers and their tributaries, which furnish extensive navigation facilities and supply the irrigation canals. Stock-raising and lumbering are important industries. The governor-general of the French possessions is resident at Hanoi, and in the separate divisions are local and subordinate governors.

INDO-EUROPEAN, Indo-Germanic, or **Aryan**, the names applied to the most important of the groups of languages into which human speech has been classified. It is subdivided into numerous branches, of which the Germanic or Teutonic is the most important, which includes the German, English, Dutch, and extinct Gothic, and is also extended to include the Scandinavian. Other branches are the Slavonic, including the Russian, Polish, and Bohemian; the Latin or Italic; the Celtic, which embraces the Breton, Irish, Welsh, and Gaelic; the Lithuanian; the Greek; the Persian; the Armenian; and the Sanskrit. The oldest literature is included in the Sanskrit and is found among the Hindus. All these branches of the Indo-European descended from a parent or ancestral tongue which prevailed at a remote period in Central Asia, and spread through succeeding centuries into India and westward through Asia to the western extremities of Europe. Searching study has demonstrated that there is a similarity in construction and meaning sufficient to warrant a classification through succeeding ages, tracing the tongues to a common source.

INDRA, a deity of the Hindus, worshiped as the supreme god throughout the Vedic period, but later assigned a subordinate place in the Pantheon. In paintings and sculpture he is represented with numerous eyes and four arms and seated on an elephant. His powers include the control of rain and shade, the hurling of thunderbolts, and the restoring of the sun to the sky. He has also been assigned a supervisory influence of Swarga, a paradise in which pious

men and inferior deities dwell in eternal felicity. Indra is interesting to the student of history for the important connections given him in the literature and legends of the Hindu peoples.

INDUCTION (ĭn-dŭk'shŭn), a term in logic that implies the process of reasoning by which we proceed from the particular to the general, and used in contradistinction to deduction, a process of reasoning from the general to the particular. In following the inductive method we not only arrive at conclusions of generals, but rise into higher generalities. It involves the process of proceeding from the known to the unknown, and obtaining a conclusion broader and deeper than the premises. In other words, induction is the process by which we conclude that what is true of certain individuals of a class is true of the whole class, and what is true in certain times will be true at all times. The impossibility of observing all particulars makes it necessary to reason inductively with much care, lest the conclusion be erroneous. The basis of induction is the established fact that nature is uniform, and by observing in detail every material fact the conclusion arrived at must be true.

INDUCTION, a term used in magnetism to describe the action by which iron and other substances become magnetic when in a magnetic field. An insulated conductor charged either positively or negatively so acts on bodies in a natural state placed near it as to decompose the neutral fluid, attracting the opposite kind of electricity, and repelling the same. Heinrick D. Ruhmkorff (1803-77), a German inventor, invented an instrument called inductive coil, by which induced currents of great electro-motive force are secured in a long secondary coil by means of rapid breaking and making of the current of electricity in a primary short coil of wire. The primary coil is short and stout, and has but few turns, and the secondary is a long, thin wire of many turns, some having a length of several miles.

INDUS, an important river in the northwestern part of India. It rises in Thibet, on the north side of the Himalaya Mountains, flows northwest, thence makes a bold curve and assumes a course toward the southwest. Its length is 1,800 miles, basin 375,000 square miles, and the delta extends about 130 miles along the coast of the Arabian Sea. Its source is 15,000 feet above the sea, on account of which the flow is rapid in many portions of its course. In navigation it is important and vessels enter safely by a number of the mouths of the delta. The Ghara River is the principal tributary, which enters the Indus about twenty-eight miles west of Bhawulpur. Many varieties of fine fish are abundant, while crocodiles and birds abound. The valley of the Indus is famed for its fertility.

INDUSTRIAL SCHOOL (ĭn-dŭs'trĭ-*al*), an institution devoted to the dissemination of knowledge in industrial arts, such as agriculture, mining, dairying, horticulture, etc. In the United States there are numerous institutions of this character supported either jointly by the national and state governments, or by either of them separately. There are also private institutions in which these arts are combined in courses of other branches of learning. In many the instruction is coëxtensive to both sexes. The term is also applied extensively to reformatory institutions established under state supervision in which youthful offenders of law and vagrant children are confined for reformatory purposes, and to teach them the arts of industry along with the elements of an education. Many of the states support industrial schools of this character for both sexes in different localities. The schools in which industrial and mechanical arts are taught as regular branches of study are abundant in European countries, those of Austria, Germany, Denmark, France, and Russia taking the highest rank.

INERTIA (ĭn-ẽr'shĭ-à), the incapability of matter to change its state, whether that be one of motion or of rest. From this follows the two laws: That a body at rest continues at rest forever unless acted upon by some force; and that a body in motion continues in motion forever unless some counteractive force, like that of gravity, act upon it. The resistance which, especially at first, a body at rest gives to a force operating to move it is called the power of inertia.

INFLECTION (in-flĕk'shŭn), the term used in grammar to designate the variation of the terminations of nouns and pronouns in declension, verbs in conjugation, and adjectives and adverbs in comparison.

INFLORESCENCE (ĭn-flŏ-rĕs'*s*ens), the arrangement of flowers upon a branch or stem. When the axis in a flower cluster terminates with a flower, the inflorescence is said to be definite; otherwise it is designated as indefinite, indeterminate, centripetal, acropetal, or botryose.

INFLUENZA (ĭn-flŭ-ĕn'zà), a contagious and often epidemic catarrhal inflammation of the mucous membrane of the air passages. The early symptoms are similar to those in a cold, accompanied by frontal headache, sleepless nights, loss of appetite, discharge from the nose, and feverishness. The affection is not usually fatal, but unless care is exercised it sometimes becomes complicated with bronchitis or pneumonia. Under good care the patient recovers in from four to eight days. In certain seasons and localities it is especially prolific in its spread, and often assumes larger proportions than any other disorder. Epidemic influenza is also designated la grippe.

INGALLS, John James, statesman, born in Middleton, Mass., Dec. 29, 1833; died Aug. 16, 1900. In 1855 he graduated from Williams College, two years later was admitted to the Massachusetts bar, and in 1858

settled in Kansas. He became secretary of the state senate in 1861, and was elected a member of that body the following year. In 1873 he was chosen United States senator as a republican, and was re-elected in 1879, and in 1885. He was president pro tempore of the senate in 1887. Subsequent to 1892 he engaged as a lecturer, writer, and newspaper correspondent, taking high rank and attaining to wide popularity.

INGELOW (in'je-low), **Jean**, poetess, born in Boston, England, in 1820; died July 20, 1897. She was a student with Elizabeth B. Browning and Rosetti (1830-1894), and attained to a high reputation as a female poet of England. After the death of the former she shared with the latter the laurel crown of English female poets. Her productions are noted for devotion, originality, and exquisite thoughts. In 1863 a volume of her poems was published, and within five years it passed through fourteen editions. Several volumes followed; the most popular being "A Story of Doom," which appeared in 1867, and "Poems by Jean Ingelow," published in 1887. Her novels include "Fated to be Free;" "Off the Skelligs;" "Don Juan," and "Sarah de Beranger."

JEAN INGELOW.

INGERSOLL (ĭng'gĕr-sŭl), **Robert Green**, lawyer and author, born in Dresden, New York, Aug. 11, 1833; died in Dobb's Ferry, July 21, 1899. After receiving a common school education, he studied law and removed with his parents to Wisconsin. Later he settled in Illinois, where he was admitted to the bar. He began the practice of law at Peoria in 1857, and soon became recognized as a lawyer of extraordinary ability. In the Civil War he served from 1862 as colonel, and in 1866 he became attorney-general of Illinois. In 1876 he nominated James G. Blaine for the presidency at the republican convention in Cincinnati, characterizing him as "The Plumed Knight." This great speech, an oration delivered on Decoration Day in New York in 1882, and his successful defense of the so-called star-route conspirators in 1883 won for him the reputation of an orator and advocate. He became known particularly for his ability as a lecturer and opponent to the Bible and the Christian religion. As a rhetorician he was preëminent, his sentences flowing easily and being dressed in beautiful, florid style, alike pleasing to the ear and the sentimental nature. However, his writings are less scientific than those of Herbert Spencer, not as subtile as those of Voltaire, nor as philosophic as the works of Hume. His best known productions include "Some Mistakes of Moses;" "The Gods and other Lectures;" "Great Speeches;" "Prose-Poems," and "Foundations of Faith."

INGRAHAM (ĭng'gra-ăm), **Duncan Nathaniel**, naval officer, born in Charleston, South Carolina, Dec. 6, 1802; died there, Oct. 16, 1891. He entered the United States navy as midshipman in 1812, was promoted to lieutenant in 1818, commander in 1838, captain in 1855, and in 1856 became chief of the bureau of ordnance. Among the interesting events of his career is the liberation, in 1853, of Martin Koszta, a Hungarian who had declared his intention to become an American citizen, and who was held prisoner at Smyrna by Greeks. In 1861 he entered the Confederate navy, in which he became commodore, and served in a number of important engagements.

INK, a liquid used for writing or printing, the different classes being known as writing, printing, marking, and copying inks. Writing inks consist either of finely divided colored precipitates held in suspension in a liquid by means of gum, or of colored liquids. The inks used by the peoples of ancient times were made with especial care to insure blackness and durability, two qualities in which they surpassed most inks of modern manufacture. Black inks contain as ingredients sulphate of iron, gum-arabic, and gallotannic taken from gall-nuts. Gall-nuts also contain pectose, by which gallotannic acid is converted into gallic acid when exposed to the air. Durability and blackness in inks are secured by utilizing iron salt with an infusion of gum and gall-nuts, and exposing the compound to the air for some time. The addition of carbolic acid, essential oils, crushed cloves, or corrosive sublimate prevents ink from becoming moldy.

Copying ink differs from the ordinary writing ink in being thicker and in drying less quickly. It is prepared by the addition of a little sugar or glycerine to ordinary black ink. Marking ink is made of a solution of silver nitrate colored by lampblack and thickened by gum, but sometimes colored with sap-green. Printing ink is much thicker than writing ink. It is made by boiling linseed oil and mixing with it lampblack or other pigments, and sometimes soap and rosin are added to give it the proper consistency. Colored inks contain various solutions of coloring matter, such as cochineal and Brazil wood for red and Prussian blue for blue, while in printing lead-chromate is used for yellow, vermilion for red, and ultramarine for blue. The ink used in lithographing is variously composed of lampblack, Paris black with shellac, virgin wax, dry white soap, and tallow or lard. Various kinds of sympathetic ink are used in secret correspondence, and leave no trace of color upon the paper, but exposure to heat causes chemical action by which the characters

become legible. Substances used for that purpose include lemon juice, solutions of cobalt, and dilute sulphuric acid.

INKERMANN (ĭn̲k-ẹr-măn′), a town in the government of Taurida, Russia, situated at the eastern extremity of Sebastopol harbor. It is celebrated on account of a battle that occurred on Nov. 5, 1854, between the Russian army and the allied French and English forces. The Russians led an attack early in the morning under cover of darkness, but were defeated by the allies. On the battlefield is a monument to commemorate the event.

INMAN, Henry, eminent painter, born in Utica, New York, Oct. 28, 1801; died in New York City, Jan. 17, 1846. He entered the West Point Academy at an early age, but soon after became interested in the study of art under John Wesley Jarvis and in 1822 established a studio as a portrait painter. In 1832 he went to Philadelphia, and in 1844 visited England, where he painted portraits of Macaulay, Chalmers, and Wordsworth. His productions comprise numerous landscape and historical subjects and excellent portraits of American statesmen, among them Martin Van Buren, William H. Seward, DeWitt Clinton, and Chief Justice Nelson. His best pictures include "Rip Van Winkle Awakening;" "An October Afternoon;" "Lake of the Dismal Swamp," and "Boyhood of Washington."

INNESS (ĭn′ẹs), **George,** landscape painter, born in Newburgh, New York, May 1, 1825; died at Bridge of Allen, Scotland, Aug. 3, 1894. He began landscape painting at the age of twenty-one, visited and studied in Florence and Rome for some time, and returned to New York City in 1868. He resided in Italy irom 1871 to 1875 and spent much of his later time in Europe. A memorial exhibition of 240 pictures painted by him sold at auction after his death for $108,670. Inness ranks as one of the most eminent American landscape painters, and possessed remarkable ability to give his productions a fine coloring, exquisite expression, and in them express feeling of moral depth. His best works include "Valley of the Shadow of Death;" "Summer Sunshine and Shadow;" "Rome from the Tiber;" "American Sunset;" "Peace and Plenty;" "St. Peter's," and "Sign of Promise."

INNOCENT, the name of thirteen popes, who reigned between 402 and 1724. Those not specially treated reigned as follows: Innocent II., 1130 to 1143; Innocent IV., 1243 to 1254; Innocent V., from Jan. 20 to June 2, 1276; Innocent VI., 1352 to 1362; Innocent VII., 1404 to 1406; Innocent VIII., 1484 to 1492; Innocent IX., from Oct. 29 to Dec. 30, 1591; Innocent X., 1644 to 1655; Innocent XII., 1691 to 1700; and Innocent XIII., 1721 to 1724. See Pope.

INNOCENT I., pope of Rome, born in Albano; died July 28, 417. According to some writers he was the son of Pope Anastasius I., whom he succeeded as pontiff in 402. During his reign Rome was besieged by Alaric, and when the sack occurred he was on a mission to Ravenna. His rule is noted for its energy and the success with which the church influence became extended. Among the events are the dispatch of several letters that marked an epoch in the church, and the enforcement of the marriage prohibition among the clergy. He is one of the most distinguished saints of the Catholics, Saint Innocent's Day occurring on July 28.

INNOCENT III., pope from 1198 to 1216, born at Anagni in 1161; died in Perugia, July 16, 1216. He studied in Paris, Bologna, and Rome, where he became a cardinal, and at the age of thirty-seven was elected the successor of Pope Celestine III. His rule was the most successful of the popes that bore his name, and he stands high among the entire list of popes. His personal vigor and strength of mind imbued him with lofty purposes, and, since he believed that the successors of St. Peter were given power over the world as well as the church, it was his ambition to secure ecclesiastical dominion over all countries and sovereigns. The two celebrated orders of monks, Franciscans and Dominicans, were confirmed by him, and these he gave vigorous support. Through various agencies he brought the most powerful countries of Europe under his dictation, among them Spain, Germany, Italy, France, and England. The characteristic confusion in the political governments of his time made it possible to carry forward papal supremacy with the most effective progress. He looked upon heresy as a rebellion and every offense against religion as a crime against society, making it the duty of every potentate to treat them likewise. A crusade against the Albigenses was called into action by him, with intent to suppress opposing tendencies and practices. In 1215 the fourth Lateran council was held under his direction. This council established transubstantiation and auricular confession as dogmas of the Catholic Church. Historians credit him with wisdom, a high and blameless character, and high ideals in Christian life. Besides many letters and sermons, he produced a remarkable treatise entitled "On the Misery of the Condition of Man."

INNOCENT XI., Benedetto Odescalshi, pope from 1676 to 1689, born in Como, Italy, May 16, 1611; died Aug. 12, 1689. He studied law at Rome and Naples, secured a liberal education, and became distinguished because of his forceful and noble character. Innocent X. made him cardinal in 1647, whose successor he became against the opposition of France. His rule marks him a reformer and vigorous organizer. It was his aim to raise the clergy, as well as the laity, to a high moral standard of living, but his rule was opposed by Louis XIV. The latter seized Avignon, a papal territory, in

consequence of a notice served by the pope that he would retain the revenues derived where bishoprics were vacant. Later Louis XIV. sent a fleet to threaten the papal states, but the pope remained firm and the difficulty was not settled until his successor, Alexander VIII., ascended to the papal office.

INNSBRUCK (ĭns-prŏŏk), a city in Austria, capital of Tyrol, situated on the Inn River. Its site has an elevation of 1,875 feet above sea-level and near it are ranges of mountains from 7,500 to 8,600 feet high. It is well connected by several trunk railroads, and has important manufactures of silks, machinery, woolen and cotton goods, ribbons, and gloves. There is a considerable trade in merchandise, live-stock, and fruits. Its important buildings include a celebrated university founded in 1677; the Franciscan church, containing an elaborate monument to Maximilian I., a number of monasteries, and an imperial palace. The streets are handsomely improved, contain modern appliances, and are ornamented by many statues and beautiful parks. Population, 24,895.

INOCULATION (ĭn-ŏk-ū-lā'shŭn), the art of communicating the virus of a particular disease to the system through the skin, or otherwise. Its purpose is to produce a mild form of some contagion and thereby protect the human body against contracting a highly dangerous form of the disease. Emanuel Timoni, a Greek physician, wrote a letter from Constantinople in 1713 favorable to inoculation, but it was not firmly established as a safeguard against smallpox until 1798, when it was introduced by Dr. Jenner. Inoculation is efficient only in diseases that attack the body but once, such as smallpox and measles. A mild form of the disease is experienced by the person artificially inoculated and this protects him against the contagion, but the disease in a dangerous form may be communicated to others.

INQUISITION (ĭn-kwĭ-zĭsh'ŭn), a court or tribunal established by the sanction of the Roman Catholic Church in various countries for the purpose of examining and punishing heretics. This tribunal was suggested by St. Dominic, but was not founded until in the pontificate of Gregory IX., when a synod at Toulouse, in 1229, resolved upon it, and it became formally established in 1233. The plan instituted carried with it the appointment of a priest and several laymen in every parish for the purpose of bringing heretics before the bishops. Soon after the power of trial was delegated to the Dominicans, and the tribunal became known as the holy office or the holy inquisition. The practice continued for several centuries, torture being applied in some cases to extract evidence, but in 1560 the power of tribunal courts was transferred to the bishop. The inquisition was introduced into Italy, France, and other countries, but attained the most widespread influence in Spain. In that country were large numbers of Mohammedans and Jews, who professed Christianity for the sake of shelter from persecution, but continued the practice of their religious rites and also sought converts to their respective faiths.

In 1481 the inquisition was established at Seville under formal sanction of Ferdinand and Isabella. Two Dominicans were made the first judges. Later it extended to other towns, where it was popular among the clergy and lower orders, but was opposed by the middle classes and the nobles. Fully 2,000 persons were held by the inquisition the first two years and burned alive. In 1571 it was introduced into Mexico and Peru. Napoleon I. suppressed it in 1808, and it was also abolished by the Spanish cortes in 1813, but was reëstablished in 1814 and again abolished in 1820. The decree of Napoleon in 1808 against the inquisition abolished it in Italy, but Pius VII. restored it to Rome in 1814. When the dungeons of the inquisition were opened in Rome in 1848, a powerful sentiment was created throughout Europe against the institution and the papacy, causing the practice to decline. It exists at present only nominally as one of the so-called congregations, under which the press censorship was supervised for some time. It never became established in England. When Conrad of Marburg made an attempt in the 13th century to establish the inquisition in Germany, he was assassinated, and it never gained a firm foothold there. Juan Antonio Llorante (1756-1823), a Spanish historian, estimates that the victims of the Spanish inquisition in the period of 481 to 1808 numbered 341,021 persons, of whom 32,000 were burned alive and 17,659 in effigy.

INSANITY (ĭn-săn'ĭ-tў), a general term applied to disorder of the intellect, or unsoundness of the mind. The nervous textures are primarily involved in this disease. Since the mind manifests itself by the brain, a restoration of the perverted functions of the brain by appropriate treatment of its structures is necessary to effect a cure. There are various terms employed by medical writers to designate the different phases of insanity, but the most common are idiocy, mania, dementia, melancholia, cretinism, and aberration. Idiocy is a congenital or an acquired defect of the mental faculties, and prevails as a total want or partial defect of understanding. Malformation of the cranium or brain is a common origin of congenital idiocy, while a disease of the brain, mechanical injury to the brain, or excessive sensual indulgences may result in acquired idiocy. Mania is a form of furious insanity resulting from disorder of one or more of the faculties, and is generally accompanied by frenzy and blind impulses.

Dementia differs from idiocy in being curable, and is a gradual weakening of the mental powers, such as loss of memory, confusion of thoughts, weak-mindedness, and

loss of volition. Melancholia is characterized by a depression of the spirits, brooding over mournful ideas, and grieving about a real or apparent loss. This form is brought on by failure in matters of business, love, religion, and personal ambitions, and not infrequently results in suicide. Cretinism is a form of idiocy and is associated with a bodily malformation. Aberration is a form of mental eccentricity. It is manifested in rambling thoughts and by error in perception, and is due largely to an abnormal state of the perceptive faculties.

Institutions for the care and treatment of the insane are maintained by all the states and in all civilized nations. Marked strides of advancement have been made in these institutions, though insanity is apparently on the increase. It is of interest to note that excessive use of tobacco at an immature age and intemperate use of alcoholic drinks, opium, and morphine are prolific causes, and that during the time of financial panics the per cent. of insane cases, like suicide, are most numerous. Insanity is an excuse in law for the commission of acts which in others would be crimes, for the reason that an insane person has no intention, but it likewise deprives a person from entering into any valid contract.

INSECTS, numerically the largest class of animals, of which the typical species have their bodies divided into three parts—the head, the thorax, and the abdomen. Formerly the centipedes and spiders, and some other animal forms, were enumerated with the insects, but now only animals having three pairs of legs are classed as insects. The legs are all affixed to the thorax, have from six to nine joints, and are designed to move with facility, enabling the insect to walk, run, swim, and in a few cases to facilitate flight. Two pairs of wings are present in most species, though in some one or the other of the pairs may be wanting. Two antennæ or feelers facilitate movement, or rather aid in guarding against danger, while the eyes are in pairs, but usually compound. The respiration is by air tubes or trachea, which extend through every part of the body. A typical insect has thirteen segments, one of which constitutes the head, three the thorax, and nine the abdomen. The mouth is of two forms, masticatory and suctorial; the former is typified in the beetles and the latter in butterflies and mosquitoes. The organ of circulation is called the dorsal vessel and consists of a contractile organism with circulatory functions. The alimentary canal is constituted of a gullet, crop, gizzard, stomach, and intestine, and terminates in a cloaca. A series of ganglia make up the nervous system. Most insects are oviparous; the sexes are in different individuals, and the reproduction sexual, but in some species non-sexual reproduction occurs.

Most species of insects have a more or less horny skin, and all pass through three stages, that of caterpillar, larva, or grub; that of the chrysalis or pupa; and that of the perfect winged insect or imago. The life of an insect depends somewhat upon climate and season, though the larval state is of longest duration, and that of the perfect insect the shortest. Some species die immediately after laying their eggs, others live out the season, and some endure a number of years, as in the case of the queen bee, whose life sometimes extends to a period of five years. Most insects have ample means of protection, though this exists principally in their ability to fly rapidly, and some protect themselves by defensive organs, as in the case of hornets and bees. It is thought that there are fully a half million species of insects, but about 200,000 are known, and these are more or less confined to particular regions. Thus the insects of China differ from those of Europe, and those of North America from the species common to other grand divisions. Yet there are species widely diffused; of this class the painted lady butterfly is a noted example.

While many species of insects are cumbersome pests to man, and show great hostility and almost constitute a barrier to his success in some portions of the earth, yet they are a very necessary and useful part of nature. Among the helpful purposes they serve are that they fertilize plants, furnish food for birds, beasts, and reptiles, and consume much of the decaying matters that would otherwise render the climate of some regions extremely unhealthful. They pervade nature everywhere; burrow in the ground, bore in trees, live under and above water, on and in plants, and many exist in other insects as parasitic animal forms. Among the most useful is the bee, that furnishes honey and in some countries produces bee-bread for the support of human life. Silkworms yield material for clothing, and their culture is a vast industry in many countries. The common wood ant is used extensively in Europe for the manufacture of vinegar, and in France as a valuable material in producing flavoring. In some countries the locusts, though destructive to vegetation, constitute a valuable food for man and animals. The cochineal insects supply a valuable coloring matter, while even the grub is a useful article of food in the West Indies. The bee also furnishes wax, the blister beetle useful irritant juices, and others serve like useful purposes.

Among the insects most injurious to man are the Hessian fly, potato bug, chinch bug, army worm, weevil, and grasshopper, all of which attack growing crops; while the moths, fleas, bedbugs, mosquitoes, flies, ants, and others invade the home, if not properly protected. Though generally pestiferous, the mosquito is a source of much good in that it is utilized in Central Africa for the manufacture of a form of cakes and serves a wise purpose in devouring decaying substances.

While insects inhabit practically all parts of the world, they are much more abundant in tropical climates, where they also attain to larger forms. Among the noted persons who have written extensively on insects and made valuable discoveries are Aristotle, Humboldt, Linnæus, Cuvier, Marcello Malpighi (1628-94), Hæckel, and Pasteur. In the United States, as in Europe, there are experiment stations in connection with colleges of agriculture for the purpose of investigating the uses of insects and the agencies that operate to destroy them. Besides, it is aimed to discover new forms unknown in their ravages, such as the minute forms in France which for years destroyed the grape industry. However, these and many others have been successfully counteracted by the application of destructive agencies. Among the substances used against insect pests are Paris green, London purple, sulphur, hellebore, kerosene, soaps, tobacco, lime, naphthalene, and arsenate of lead.

INSESSORES (ĭn-sĕs-sō′rēz), a name applied by many writers to a large order of birds, which includes the perchers. The order embraces all those that live habitually among trees, excluding only the climbing birds and the birds of prey. Their feet are adapted to walking and perching. They possess much contriving ingenuity in building their nests. The order of insessores embraces all the more noted and beautiful birds of song.

INSTINCT (ĭn′stĭnkt), a natural impulse by which animals are directed without reasoning toward the actions that are essential to their existence, preservation, and development. The theories advanced regarding animal instinct include at least three. These are that each species is endowed by the Creator with various faculties and impulses; that the instincts have resulted from consecutive repetition, and these have been transmitted by inheritance to subsequent generations; and that they arise from unknown causes, though the more complex are modified through natural selection and the simpler actions of an instinctive nature. In some animal forms the instincts are developed to a high state of perfection, as is the case in bees, by which they are enabled to construct cells with a perfection that would tax quite highly the reasoning powers of man, and he would be able to secure equal results only by the application of the higher mathematics. Darwin thought that animals in the past as now have varied in mental qualities, and that those variations are inherited. He likewise thought that by natural selection the instincts of many animals have been developed to a higher degree.

INSTITUTE (ĭn′stĭ-tūt), a scientific body or society established under certain rules for the promotion of some particular object, as a literary or philosophical association. The term is applied in France to the principal society of its kind in the world, which was formed in 1795 by the union of the four principal royal academies—the Academie des Belles Lettres et Inscription, Academie Francaise, Academie Royale des Sciences, and Academie Royale d'Architecture. At present this great institution embraces five distinct divisions, each of which represents a particular field of knowledge. The divisions are Academie Francaise, Academie des Beaux Arts, Academie des Sciences, Academie des Inscriptions et Belles Lettres, and Academie des Sciences, Morales, et Politiques. In each division is a distinct organization, and the control of its finances is under different boards. Membership is for life, with a salary of 1,500 francs. To become a member of this celebrated organization is a worthy ambition of every Frenchman of educational advancement. The official name is Institut National de France, by which it has been known since 1848.

INSURANCE (ĭn-shur′*a*ns), a system by which a company, in consideration of a sum of money paid, becomes bound to indemnify the insured or his representatives against losses by accident, fire, storm, or, in case of life insurance, to pay a certain amount in case of death. The different classes of insurance now recognized include principally fire and lightning insurance, life insurance, accident insurance, marine insurance, and insurance against cyclones and tornadoes. Among the earliest instances of insurance is the one connected with the Second Punic War against the Romans. The first systematic insurance mentioned in modern times was that of Barcelona, when the magistrates issued ordinances, in 1435, relating to this class of business, though special instances of insurance by potentates in cases of marine commerce and losses in agriculture by storms are mentioned much earlier. In the reign of Elizabeth, in 1601, the English statutes first recognized insurance, but in continental Europe it was systematized and legalized some earlier. Marine insurance is the oldest form, and was instituted for the encouragement of commercial relations with other countries among many of the governments of the Middle Ages.

At present insurance has assumed vast proportions and represents a large volume of accumulated capital. It has also become diversified, each class of insurance being subdivided into many departments and covering greatly diversified classes of risks on life and property. Some of the most beautiful and costly buildings in the world are owned by insurance companies as an investment, and they also hold large interests in government and railroad bonds, canal securities, stocks, farm and city loans, and mining stocks and bonds. In the insurance business two distinct classes are recognized, mutual and stock companies. The mutual insurance companies are the newer, and

represent organizations in which the individual insured participates in all the profits of the company and contributes directly in case of losses, while in stock companies individuals are insured for a definite amount and receive definite payments in case of loss. Besides these classes are fraternal insurance companies, in which the fraternal and insurance features are combined in a society or an association. Mutual companies also exist among farmers and other classes, in which they insure each other against property losses by fire, lightning, or storms.

Life insurance is based upon the experience of different companies; on this they assume risks and calculate their sources of profit and loss. Below is a synopsis of an insurance table, in which is shown the experience of thirty life insurance companies:

AGE, YEARS.	DEATHS PER 1,000.	LIFE EXPECTATION IN YEARS.	AGE AT PROBABLE DEATH IN YEARS.
20.....	7.29	41.49	61.49
30.....	8.43	34.43	64.34
40.....	10.36	27.28	67.28
50.....	15.94	20.18	70.18
60.....	30.34	13.77	73.77
70.....	64.93	8.54	78.54
80.....	140.41	4.78	84.78
90.....	323.73	2.11	92.11
99.....	1,000.00	.50	99.50

A number of terms are used in the insurance business, these being recognized both in law and contracts as more or less clearly implying certain parties or facts. Among them are the terms underwriter or insurer, meaning the party taking the risk; the assured or insured, the party promised compensation in case of loss. The premium is the amount paid for insurance; the policy is the written contract; the risks or perils constitute the events insured against, and the insurable interest is the interest, subject, or right to be protected. The laws of all the states and of the United States have been constructed with a view of bearing upon the insurance interests and protecting the assured against fraud or loss by unsound companies. In all companies the premium paid is governed by the nature of the risk taken; property exposed to unusual danger requires the payment of a higher premium, while the age and class of individuals influence largely the premium in life insurance companies. Although the adjustment of these matters is left largely to individual companies, they are under state supervision, and adequate security to the insured is explicitly demanded under all circumstances.

INTEREST, an allowance made for the use of borrowed money. The money paid on borrowed money is called interest; the money on which interest is paid is termed the principal, and the interest and principal taken together constitute the sum or amount. Interest is either simple or compound. Simple interest is computed at a certain rate for the whole time on the loan. Compound interest arises when the simple interest is not paid when due. To illustrate: $100 at 6 per cent. for one year amounts to $106. For the second year the principal is $106, the interest $6.36, and the amount $112.36. The rate of interest depends upon various conditions, among them the amount of money in circulation in a given country or state, the demand for money, the amount offered for investment, and the nature of the security offered, or the personal liability of the borrower. The legal rate of interest is a rate allowed by law, and any excess charged is termed usury. In some states a rate higher than the legal rate may be provided by contract, as in Iowa, where the legal rate is 6 per cent., but by contract 8 per cent. may be stipulated. Contracts providing more than the rate of interest allowed by law are void and not collectible.

INTELLECT (ĭn'tĕl-lĕkt), that faculty of the mind by which we know. Ideas are communicated to the mind by the senses or by other means. Through the intellect the mind becomes able to perceive objects in their relations, upon which depends its power of judging, reasoning, and comprehending. It is distinguished from the other two powers of the mind—the power to feel and the power to will.

INTERLAKEN (ĭn'ter-läk-en), meaning between the lakes, a village of Switzerland, situated in the valley of the Aar, between Lakes Brienz and Thun. It was founded by Augustine monks in 1130, and is noted as a favorite resort; the number of persons visiting it aggregates about 25,000 annually. The railroad connections are convenient, making it possible for tourists to visit many points of historical interest and witness the most celebrated glaciers and other noted natural sceneries within its vicinity.

INTERNATIONAL LAW (ĭn-tĕr-năsh'-ŭn-al), the term applied to what was formerly called the law of nations. It comprises the rules and established doctrines that govern states and nations in their conduct toward one another, and the relations of citizens of different countries in their social and commercial affairs. The system was created by modern nations and is recognized by the civilized peoples of the world. New rules are introduced by war and by treaties of peace. Among the more important matters provided for by international law is the equal and common right to sail upon the high seas, where all nations have equal authority to enforce their own laws and the established laws of nations. The domains of other nations cannot be interfered with, and if a fugitive from justice escapes into a foreign state, the nation from which he escaped has no right to enter the foreign country for his arrest, but may request that he be surrendered.

The commercial relations of different coun-

tries may be regulated by treaty without the interference of other nations, for which purpose all nations may send and receive public ministers or delegations, and their persons and property must be protected properly. Any visiting foreigner is required to obey the laws of the country in which he sojourns, and is entitled to the same treatment as the natives. In making treaties ministers usually treat with each other or with representatives, but the compacts formed are not deemed binding and formal until they have been ratified by the respective governments. Liberties are granted to all nations alike for the purpose of extending their navigation, improving commercial and agricultural industries, developing national resources, making exploration expeditions, and establishing trade relations. In the time of war the property of the different nations involved, as well as of the persons engaged in unfriendly acts, are subject to capture anywhere and neutral nations are bound to maintain impartiality between the contending countries. Besides, neutral nations are understood to prevent every interference on the part of their subjects in the matter of aiding the hostile country or in any manner giving aid or support to the enemy.

INTUITION (ĭn-tū-ĭsh′ŭn), the power of the mind by which we obtain ideas and truths not derived through the special senses, nor by an elaboration of the understanding. The products of intuition are termed primary ideas, and include those of space, time, cause, identity, being, right, and personal identity. Primary ideas, or primary truths, as they are sometimes called, are all self-evident, as the axioms of logic and mathematics. The ideas derived through the intuitive power spring up immediately in the mind upon the presentation of the proper occasion. They are not the product of sensation or perception, but arise spontaneously. Kant speaks of the intuitive power as the reason, a term quite appropriate, since it appears to be the element of the mind that gives to it a condition of rationality.

INVERTEBRATA (ĭn-vĕr-tē-brā′tȧ), a subdivision of the animal kingdom. It includes the animals that have no vertebral column or backbone, and are distinguished from the higher group that possess a vertebral column, the latter being known as vertebrata. In the invertebrate animals nothing resembling a cartilaginous spinal column is found, and the more solid portions of the body are on the outside, thus constituting a protective shell, as in the case of the oyster, lobster, and clam. Naturalists now recognize five different divisions of the invertebrate animals: the mollusca, protozoa, annulosa, cœlenterata, and echinozoa or annuloida.

INVOLUTION AND EVOLUTION, two operations converse to each other, and employed extensively in mathematics. The object of involution is to raise a number to any power, which is effected by multiplying the number by itself, as $2\times2\times2=8$. Thus, the third power of two is eight. On the other hand, evolution is the extraction of a root of any number; that is, by means of it we may find what number, when raised to a certain power, gives the known number. For instance, sixty-four is the power of some number, and by evolution we find that eight is the square root: thus eight multiplied by eight equals sixty-four.

IO, in Greek mythology, the daughter of Inachus, king of Argos, and priestess of Juno. Her beauty attracted the love of Jupiter, and consequently excited the jealousy of Juno, but Jupiter transformed her into a cow to protect her from the intrigues of Juno. Argus, having one hundred eyes, was appointed by Juno to watch over Io. He never closed more than two of the eyes at a time, thus being able to watch constantly, but Jove charmed him to sleep by playing on his magic lyre, and while in a helpless condition slew him. His eyes were subsequently used by Juno to decorate the tail of the peacock. Later Io was restored to her natural form, became the wife of King Osiris, and gave birth to a son called Epaphus, who afterward became king of Egypt. The Egyptians worshiped Io after her death under the name of Isis. Æschylus recites the story of Io in his work entitled "Prometheus."

IODINE (ī′ō-dĭn), a blueish-black non-metallic elementary crystalline substance. When heated it yields fumes of a rich violet hue. It is obtained principally from the ash of sea-weeds called kelp, but occurs also in oceanic waters and mineral springs. Iodine is found also in marine molluscous animals, in cod-liver oil, and in certain land plants. It is employed in medicine and photography. In medicine it is used either in the pure state or as iodide potassium, and is useful in the treatment of scrofula, rheumatism, spleen, and liver diseases, and in many maladies as an agency to kill parasites. It is used in photography to prepare aniline colors and for other purposes. In the treatment of glandular affections, chlorosis, scrofula, and other diseases iodide of iron is a valuable remedy.

IOLA (ī-ō′lȧ), a city in Kansas, county seat of Allen county, on the Neosho River, thirty-seven miles west of Fort Scott. It is at the junction of several important railroads, and is surrounded by a farming and natural-gas producing country. There are manufactures of clothing, cigars, furniture, and machinery. Electric and gas lights, good schools, numerous church buildings, and a library are among the improvements. Population, 1900, 5,791.

IONA (ē-ō′nȧ), the modern name applied to the most celebrated island of the Hebrides, an island group lying northwest of Scotland. Its length is three and a half miles, breadth one and a half miles, and area 2,265 acres. It

has a history beginning in 563, when St. Columba landed with twelve disciples and there built a monastery. The soil is exceedingly fertile and from early times yielded extensively. The monastery established by St. Columba was the first church of the Picts. It has furnished many interesting pages in the development of the Catholic faith in the British Isles.

IONIA (ī-ō′nĭ-ą), the name applied anciently to the most flourishing country of Asia Minor inhabited by Ionian Greeks. According to tradition it was so named from Ion, one of the five Greek tragic poets, reputed a son of Apollo. The Ionian Greeks settled in Asia Minor about 1050 B. C., when they were driven from the Peloponnesus by the Achaians. They built twelve towns of much importance which formed the basis of the Ionian League. In 557 B. C. the region became a possession of Cyrus, king of Persia, but it was acquired in 331 B. C. by the Greeks under Alexander the Great. In the year 64 B. C. the entire region was added to the Roman Empire by Pompey, and subsequently the Turks devastated and destroyed most of the evidences of early civilization, as the temples and amphitheaters. The Ionic dialect was commonly spoken by the people of Ionia, and was noted for its smoothness on account of containing a large number of vowel sounds.

IONIA, county seat of Ionia county, Michigan, on the Grand River, thirty-two miles east of Grand Rapids. It has good railroad facilities and a growing trade. The surrounding country is agricultural, and its industries manufacturing and jobbing. It is the seat of important railroad shops, an excellent school system, the state asylum for insane criminals, and the state house of correction and reformatory. The municipal facilities are modern. Population, 1904, 5,222.

IONIAN ISLANDS, a chain of about forty islands stretching along the southwestern coast of Greece, of which Cephalonia, Corfu, Zante, Ithaca, Paxos, and Santa Maura are the most important. The total area is given at 1,025 square miles, and the population at 248,500. Most of the inhabitants are of Greek descent. They engage in agriculture, fruit growing, and manufacture, and constitute a part of the kingdom of Greece. Among the exports are fruits, oil, salt, wine, soap, textile fabrics, and ornamental articles. The Venetians ceded the islands to France in 1797, but they were seized by Russia and Turkey two years later, and by the treaty of Tilsit were restored to France in 1807. Later they became the scene of various political disturbances, but in 1863 were made a part of Greece, to which country they have belonged since. The surface is diversified by valleys and mountains. Earthquake disturbances are not infrequent.

IONIAN SEA, the name applied since ancient times to the portion of the Mediterranean that lies between Greece and Italy, and is connected by the Strait of Otranto with the Adriatic. It contains the Ionian Islands. There are fine fisheries and an extensive navigation trade along its coasts.

IONIC ARCHITECTURE (ī-ŏn′ĭk), a style of Grecian architecture that originated in Ionia, and which is distinguished particularly by the capital of the columns. It derived several features from Assyria, and entered largely into many celebrated temples erected in Greece and Asia Minor. The best examples still existing include the Acropolis at Athens, the temples of Minerva Polais, and that of Fortuna at Rome. A modified form of this order is known as the Roman-Ionic, of which the latter temple is a representative.

IOWA (ī′ŏ-wą), a west central state of the United States, situated between the Mississippi and Missouri rivers. It is bounded on the north by Minnesota, east by Wisconsin and Illinois, south by Missouri, and west by Nebraska and South Dakota. Its length from east to west is 300 miles, breadth 200 miles, and area 56,025 square miles, about the same as the combined areas of Ohio, Maryland, and Delaware. The surface is an undulating plain, watered by numerous rivers along which extend bluffs and hills. It has an average elevation of about 900 feet, contains no mountains, and possesses a surface almost exclusively fertile. The lowest point of the state is at the junction of the Des Moines and Mississippi rivers, which is 445 feet, while the most elevated point is in Dickinson county, where the elevation near Spirit Lake is 1,695 feet. Along the Mississippi and Missouri rivers are bluffs ranging from a few feet to 400 feet above the valleys, which are from one to twelve miles in width. The drainage of the greater part of the state is into the Mississippi, but the western and southern portions drain into the Missouri. Among the principal streams are the Des Moines, Iowa, Cedar, Wapsipinicon, Skunk, Nodaway, Boyer, Little Sioux, and Maquoketa rivers. The Big Sioux River forms a portion of the western boundary. None of the rivers are navigable, but the Mississippi and Missouri furnish ample facilities for all classes of inland navigation. Fine belts of timber skirt the streams and supply excellent material for building and fencing, including the oak, maple, elm, hickory, bass, cotton, willow, and walnut. In the north-central part of the state are numerous lakes, among them Spirit Lake, Okoboji, Storm, Swan, Turtle, and Clear lakes. The climate is favorable for all forms of agriculture and varies mainly on account of latitude, the altitude not being sufficiently diversified to affect it materially. The average annual temperature is about 48° and the rainfall from twenty-four to forty-five inches. All parts of the state have an abundance of moisture and a temperature agreeable and healthful.

The mineral deposits of Iowa include lead, coal, gypsum, limestone, mineral paints, and clay. However, the coal deposits are the most important, and embrace an area of about 20,000 square miles. There are produced annually 4,875,000 tons of bituminous coal, which has a value of $5,840,000. Among the manufactured products are tobacco, cigars, brick, tile, flour, packed meat, farming machinery, ironware, vehicles, brooms, and implements. The most important agricultural products are corn, which has an average annual value of $82,500,000; oats, $30,250,000; wheat, $12,525,000; barley, $4,150,000; potatoes, $5,110,000; hay, $35,500,000; and rye, $475,000. The rearing of horses, mules, cattle, sheep, and swine is very extensive. In the production of swine the state has long taken first rank, and in the production of milk cows and horses usually second or third. It also takes first rank in the production of butter and cheese, the latter having an annual value of $18,500,000. The transportation facilities are adequate, including about 9,500 miles of railroads, which extend to every portion of the state. A canal around the Des Moines rapids is the only one in the state. Within recent years the production of sugar beets has become an important industry, likewise the production of glucose and starch.

Educationally the state of Iowa has long occupied a very high position, its per cent. of illiteracy being among the lowest. District schools and central high schools are adequately supported by public taxation, and are supplemented by a large number of state and private institutions of higher learning. The entire system of public instruction is under the supervision of a state superintendent, who is assisted by county and city superintendents. Adequate and articulated courses of study are pursued in all the schools, making it possible to effect helpful assignment of studies in case of promotion for advanced work. The expenditure for education aggregates annually $8,500,000. The public institutions include a state normal school at Cedar Falls, a college of agriculture and mechanic arts at Ames, and a state university at Iowa City. There are penitentiaries at Anamosa and Fort Madison; insane asylums at Mount Pleasant, Independence, Clarinda, and Cherokee, and industrial schools at Eldora and Mitchellville. Besides these institutions, there are ample provisions for the care of the blind, feeble-minded, deaf and dumb, soldiers' and sailors' orphans, and aged soldiers. Among the many important private and denominational institutions are Drake University, at Des Moines; Central University, Pella; Iowa College, Grinnell; University of the Northwest, Sioux City; Cornell College, Mount Vernon; Coe College, Cedar Rapids; Luther College, Decorah; Wartburg College, Clinton; Highland Park College, Des Moines; Oskaloosa College, Oskaloosa; German-English College, Charles City; Simpson College, Indianola; and Des Moines College, Des Moines. There are churches of all denominations included in about 6,000 organizations with a total membership of 650,000. The periodicals published number 1,190, of which seventy-five are dailies and 810 weeklies. This number includes many devoted to educational arts and embraces sixty in the German language.

The state of Iowa was included in the Louisiana Purchase of 1803, and in 1834 became organized as a part of Michigan territory. In 1836 it was made a part of Wisconsin territory, and in 1838 the territory of Iowa was organized. It was admitted as a state in 1846, and in 1856 Des Moines became the capital. Julien Dubuque, a French Canadian, in 1788 obtained a grant of land near the present city of Dubuque, and, besides operating lead mines, carried on a trade with the Indians. The first permanent settlements were made in 1833 near Burlington, and since then the state has been developing under a continuous era of prosperity. Its name, Iowa, is from the Indian and means "The beautiful land," while the popular name is Hawkeye State. The important cities include Des Moines, the capital, Davenport, Dubuque, Council Bluffs, Sioux City, Cedar Rapids, Burlington, Clinton, Ottumwa, Keokuk, Muscatine, Marshalltown, Fort Madison, Boone, and Fort Dodge. The census of 1900 accords the state a population of 2,231,853. The total colored population is 13,186, or 0.6 per cent., which includes 12,693 Negroes and 382 Indians.

IOWA CITY, a city in Iowa, county seat of Johnson county, and the capital from 1839 to 1856. It is situated on the Iowa River, surrounded by a fertile agricultural and dairying country, and is an important railroad junction. Among the manufactures are paper, flour, gloves, vehicles, packed pork, ironware, and machinery. There are electric lights, street railways, waterworks, pavements, and other improvements. The public school system is in a flourishing condition. It is the seat of the Iowa State University and the Iowa City Academy. Population, 1900, 7,987.

IOWA COLLEGE, an important educational institution situated at Grinnell, Iowa, and the oldest college in the state. It was founded at Davenport in 1847 by Congregationalists, but removed to Grinnell in 1860. It is co-educational, has an able corps of instructors, and is attended by 500 students. The annual income is $40,500 and the library includes 25,000 volumes.

IOWA INDIANS, an Indian tribe of the Dakota family that formerly lived in the vicinity of the Mankato River, Minnesota. In 1700 the tribe numbered about 1,500, but at present there is a remnant of only about 125, who are colonized on reservations in Indian Territory and Kansas. This tribe led several destructive wars against the Osage

Indians. The Iowas have taken kindly to the industries.

IOWA RIVER, an important river of Iowa that has its source near the Minnesota boundary, and after a course of 300 miles discharges into the Mississippi. It flows through a fertile agricultural country, is skirted by a belt of valuable timber, and contains many varieties of fish. Among the cities on its banks are Eldora, Marshalltown, and Iowa City.

IPHIGENIA (ĭf-i-jē-nī'a), in Grecian legends, the daughter of Agamemnon and Clytemnestra. It is related that Agamemnon offended Diana and as an atonement offered to sacrifice the most beautiful being born within the year. Since this happened to be Iphigenia, payment of his vow was long delayed, and when he placed her on the altar she was caught up in a cloud by Diana and carried to Tauris. Later she became priestess to Artemis, and subsequently was removed to Attica by her brother Orestes, whose life she saved. The legend of Iphigenia forms the subject of many Grecian poems. She is the hero of one of Schiller's most beautiful plays.

IPSWICH (ĭps'wĭch), a town and riverport of Suffolk county, England, on the Orwell River, about sixty-eight miles northeast of London. The streets are tortuous and narrow. Within recent years it has made material development on account of its navigation and railroad commerce. There are several fine schools, hospitals, and churches. The manufactures include flour, soap, beverages, machinery, agricultural implements, and fabrics. Shipbuilding is an extensive enterprise. It has electric lights and street railways. Population, 57,875.

IQUIQUE (ē-kē'kā), an important seaport of Chile, capital of the province of Tarapaca, and connected by railway with other trade centers. In its vicinity are extensive mining interests, including silver, iron, borax, iodine, saltpetre, and nitrate of soda. The climate is quite hot but healthful, and earthquakes are not infrequent. Prior to 1881 it belonged to Peru, but in that year it became a possession of Chile. There is an important trade in live-stock, fruits, lumber, and minerals. Population, 22,520.

IRANIANS (ī-rā'nĭ-*a*ns), a people belonging to the Aryan or Indo-European family, and sometimes mentioned as Persians. The Medes were the first of these people of whom we have historic record, and are mentioned as early as 2400 B. C. There are three groups of Iranian languages: the Old Persian cuneiform inscriptions; the Zend or Old Bactrian, the language in which the sacred writings of the Parsees is committed; and the Middle Iranian or Pehlevi languages, in which the Zend-Avesta commentaries are preserved. The modern Iranians inhabit regions west of the Indus River. Among them are the Kurds, Aimags, Afghans, Tajiks, Armenians, and the Persians. The modern Persian is Iranic, but contains many Arabic words. In this language many celebrated masterpieces of literature were produced.

IRELAND (īr'land), a large island about sixty miles west of England, from which it is separated by St. George's Channel and the Irish Sea. It is bounded on the south, west, and north by the Atlantic Ocean, and on the northeast by North Channel, which separates it from Scotland. Its length from north to south is 306 miles, width from 115 to 180 miles, and area 32,531 square miles; population, 4,456,546. There are four provinces and thirty-two counties, the provinces being Leinster, Munster, Ulster, and Connaught. The coast is indented by a number of bays, among them Donegal, Galway, Dundalk, Lough Foyle, and Dingle bays. There are many excellent harbors. The coast varies from gradual elevations to precipitous heights. Small islands abound along the western shore, the largest being Achill. The surface is diversified, including large tracts of undulating districts and elevated ranges of hills and mountains, the greatest height being about 3,500 feet. Mt. Carrantual, a peak of the Macgillicuddy's Reeks, in the southwestern part, is the highest, 3,415 feet. There are a number of rivers but none are large, among them the Shannon, Nore, Barrow, Slaney, Boyne, Bann, Foyle, Black Water, Suir, and Lee. The inland lakes include Lough Derg, Lough Ree, Lough Mask, Lough Neagh, and Lough Erne. Among the minerals are iron ore, coal, lead, salt, slate, and alum. The climate is milder and more equable than that of England, and is highly favorable to vegetation. Its fisheries are quite important, yielding valuable quantities of marketable species, including herring, eel, pike, trout, and salmon.

The more important industries of Ireland are agriculture, manufacture, and commerce. Its arable surface is rich in a productive loam, but there are large districts of moorland. The land titles are vested in large owners, who lease the estates to tenants, and much of it is sublet in small tracts. Stock-raising and dairy-farming are alike important. Among the staple products are wheat, oats, rye, potatoes, flax, and hay. There are extensive interests in cattle, horses, sheep, goats, and swine. The manufactures embrace linen and woolen goods, fermented and distilled beverages, canned salmon and other fish, machinery, and agricultural implements. Whisky and linen goods are the principal exports. Railroads have been built through all portions of Ireland, thus connecting the coast with all the productive interior points and giving it extensive and growing importance as a center of trade.

The prevailing religion is Roman Catholic, the clergy of which is supported by voluntary contributions. Nearly one-third of the people are Protestants, the sects being

Anglicans, Presbyterians, Methodists, Independents, Baptists, and Quakers, in the order named. The Anglican, or Episcopal Church, was the established church until 1869, and includes 620,500 adherents, while the Presbyterian Church has 445,000 communicants. Elementary schools are under the management of the commissioners of national education and are maintained in all the districts. Besides the common and high schools, several colleges, seminaries, and universities are supported. Of the higher institutions the most important are the University of Dublin; Queen's colleges of Belfast, Cork, and Galway; University College, Dublin; St. Patrick's College, Maynouth; and the Royal College of Science. The government is administered by Great Britain, in whose parliament Ireland has twenty-eight peers in the house of lords and 103 representatives in the house of commons. Among the principal cities are Dublin, Cork, Limerick, Londonderry, Waterford, Rathmines, Belfast, Galway, Kingstown, Newery, and Wexford.

The early history of Ireland is wrapped in fable. It is thought that the Iberians were the earliest inhabitants. Later the Celts settled in Ireland, coming there at different times, and still later came large numbers of Scots. In the middle of the 5th century Christianity was introduced by St. Patrick, a man of Scottish birth, who was taken a slave to Ireland while still young. Later he escaped to Rome and returned to Ireland with the avowed intention of introducing Christianity. His work was attended by much success and Ireland became a seat of learning, while its monasteries supplied many noted missionaries to operate in continental Europe. The various elements were at hostility with each other, and the prosperity was more or less affected by the incursions of the Danes and other invaders from the north. In 1167, while Henry II. was king of England, the Norman invasion occurred. At that time the island was districted into counties, the lands were divided among Norman barons, and English courts were established at Dublin. Then also originated the feudal titles to lands, which are still a hindrance to the prosperity and success of the common people. A heroic defense was made against the invaders, and at the beginning of the 16th century the English were still unable to conquer the larger part of Ireland. An act of the Irish parliament granted Henry VIII. the title of king of Ireland, instead of lord, as was the case in the reign of Henry VII. This sovereign confiscated church lands and attempted to force the people away from the Catholic religion, a measure bitterly opposed by the Irish. Elizabeth instituted a Protestant clergy, but the movement occasioned numerous uprisings under the earl of Tyrone. At the time of the civil war in England the Irish rose in rebellion and attempted to become free from English oppression, but they were subdued by Cromwell in 1649. This war was marked by many atrocities perpetrated on both sides, and after Irish defeat they were largely driven to Connaught, while English and Scotch settlers occupied the other portions. The struggle for independence continued during the reigns of Charles II. and James II., but, when the Irish preferred James to William III., the latter invaded Ireland in 1690, and in the battle of the Boyne defeated the forces of James. In 1691 the Irish were defeated at Galway and Limerick, but a treaty was concluded by which the Catholic Irish were given religious liberty. This treaty was violated by parliament granting about one million acres of land to the Protestants, and severe penal laws were passed against the Catholics, by which it was aimed to exterminate that faith. The enactment of these laws excited bitter opposition.

When the war for American independence began, it gave the Irish an apparent opportunity to become free. Some of the penal laws were modified to appease the people, privileges to erect schools were extended, and fewer restrictions placed on religious observation. However, a declaration of independence was made by the Irish parliament in 1782 under the leadership of Grattan and Flood. The uprising was supported by both Protestants and Catholics in Ireland, who were alike anxious to secure more wholesome legislation for the common people, and also to obtain liberty of conscience. When the French Revolution began, in 1798, the Society of United Irishmen was instrumental in making another desperate effort for independence, but the movement was crushed after great atrocities had been committed. A resolution was now formed to compel the Irish parliament to unite with the English, and by very questionable methods it was induced to pass an act of union in 1800. On Jan. 1, 1801, Ireland was united with England in the same manner that Scotland had been assimilated, and the English parliament became the one supreme legislative authority.

In 1829 the Catholic emancipation act went into effect, a measure making Catholics eligible to most public offices and to membership in parliament. Since then many strenuous efforts have been made to secure the independence of Ireland, particularly in 1848 and 1865; the movement of the latter year being known as that of the Fenians, which received marked support in the United States. This was followed by dis-establishment of the Irish Episcopal church in 1869 and slight modification of the land tenure law. Subsequently agitation for home rule became the leading question—a movement designed to give Ireland a local parliament and local self-government under English sovereignty, similar to that of Canada and Australia. Among the distinguished leaders in favor of this movement may be named

Parnell, and Isaac Butt (1813-79), while the cause was ably defended by such Englishmen as Gladstone and Bryce. The National Land League was organized in 1883, which succeeded the Land League, and has for its object the acquisition of title to land by Irish tenants, a movement certainly of much value to the tenant farmers. The people of Ireland are still active in advocating industrial emancipation along with their sentiments for political independence.

The Irish language is a branch of the Celtic and belongs to the Gaelic, being allied to the Manx and Scotch Gaelic, and to the British dialects known as Cornish, Welsh, and Armoric. About 65,000 people of Ireland speak only the Irish, while 890,000 speak both the English and the Irish. A widespread movement is now in progress by which it is designed to preserve the language and extend its use, a plan projected both in Ireland and the United States. The literature of the Irish is extensive, including legendry, history, poetry, and many works of value in theology and romance, some of the earlier dating from the 5th century. Many of the most eminent men classed with the English scholars and authors are more properly Irish. They have given that language some of the most beautiful poems, searching historical writings, and eloquent orations. The Irish people have come to America in large numbers. They have taken a prominent part in national affairs, and they and their descendants comprise a large and influential element in all the states.

IRELAND, John, Catholic prelate, born in Kilkenny, Ireland, Sept. 11, 1838. When a child he came to Minnesota with his parents, who settled at St. Paul. He was ordained priest at St. Paul in 1861, became a chaplain in the army, and after the war was rector of the cathedral at St. Paul. In 1875 he was ordained bishop, and in 1888 became archbishop of St. Paul. He is noted as an advocate of temperance and an able speaker, and is influential as a controversialist and writer.

ARCHBISHOP IRELAND.

IRENE (ī-ree'ne), empress of Byzantine, born in Athens, Greece, about 752; died in the isle of Lesbos, Aug. 15, 803. By her beauty and talent she attracted the attention of Leo, afterward Emperor Leo IV., whom she married in 769. After the death of her husband, in 780, she became regent of her son, Constantine VI., who ascended the throne when only nine years of age. Her regency was marked by many internal disturbances and political conflicts, and in 802 she was banished to the isle of Lesbos, where she died of grief the following year. Though wise and energetic as a ruler, she is charged with many acts of cruelty. Her zealous devotion to the Greek Church caused her to be placed among its saints.

IRIS (ī'rĭs), in Greek mythology, the daughter of Thaumas and Electra, who was the messenger of the gods and personified the rainbow. She became the wife of Zephyrus and the mother of Eros. Her mission was to communicate between gods and men, a task she executed with singular tact, intelligence, and swiftness. She is represented with the staff of a herald in her left hand and with wings attached to her shoulders, ready to perform her duties at the bidding of Hera.

IRIS, the generic name of beautiful plants, sometimes called flag and fleur-de-lis, and native to the temperate climates. There are many species, some of which are noted for their medicinal properties and others on account of their beautiful flowers. Most species grow in wet and marshy places and bear a variety of flowers, of which the most common tint is blue. The best known species of the United States include the blue flag and common iris, the former growing in marshy places and the latter being distinguished on account of its grassy leaves. The common iris has ornamental flowers of a violet-blue color, but variegated with veins of white-green or yellow. Its stems are about three feet high. Among the naturalized species grown in gardens are the beautiful Spanish, Chalcedonian, Persian, and the snake's-head.

COMMON IRIS.

IRIS, the colored portion of the eye surrounding the black central pupil. It consists

of a muscular curtain of three layers, the anterior, posterior, and middle fibrous.

IRKUTSK (ĭr-kōōtsk'), an important city of Siberia, capital of a government of the same name, and the residence of the governor-general of Eastern Siberia. It is located near Lake Baikal, on the great transcontinental railway, and has broad streets, excellent public buildings, and modern municipal facilities. The city has electric lights, rapid transit, pavements, and sewerage. Among its public institutions are a cathedral, museum, public library, and a well organized public school system. There are several fine hospitals, churches, and seminaries. The manufactures include linen goods, leather, machinery, furniture, and woolens, while the trade in tea, furs, and cereals is very extensive. Irkutsk was founded in 1652, but its prosperity dates from the railroad development and the growth of Russian influence on the Chinese boundary. Population, 60,525.

IRON (ī'ŭrn), the most important of all metals. It is found in nearly all forms of clay, earth, and rock, though rarely in a pure state. When pure, it is silvery-white, very tenacious, malleable, and ductile. The commercial product is derived from ores, which are abundant and widely distributed, and are known as magnetite, hematite, cashonite, and limonite. It is found in both sea-water and mineral water, and forms an essential constituent of plants and animals. The sun and stars contain iron and it constitutes a large portion of meteorites that fall from space to the earth. Pure iron burns before reaching the melting point, and therefore must be combined with other substances to make it of the greatest utility, such as sulphur, copper, silicon, carbon, arsenic, phosphorus, and other metals with which it forms important alloys. Cast iron is a commercial iron produced in a blast-furnace and contains a large proportion of carbon, is neither ductile nor malleable, and may be easily cast in molds. Wrought iron is usually fibrous, ductile, and malleable, is produced in a puddling-furnace or a forge, and contains very little carbon or other impurities. Weld-iron, bar-iron, and steel are different compounds of iron; contain less carbon than cast iron and more than wrought iron, and can be forged, tempered, cast, and materially hardened by heating to redness and cooling suddenly. The several varieties of iron manufactured differ in the degree of their properties as well as in the proportions of their constituents, and by different applications serve man in an unlimited field of useful purposes. Salts of iron are used largely in medicine as tonics.

Iron is one of the metals earliest known in history, being mentioned in the Bible as early as Genesis iv, 22, where Tubal-Cain is spoken of as "instructor of every artificer of brass and iron." Egyptian sepulchers represent butchers sharpening their knives on a round bar of metal. It is reasonably certain the discovery of iron at Mt. Ida dates from 1406 B. C. The vast deposits of iron ore in India were known from remote times, and the Romans utilized products of iron at an early period. Iron mines were operated in Britain as early as 54 B. C., and much earlier in continental Europe, especially in Germany, Spain, and Rome. When the Egyptian obelisk was removed from Alexandria to New York, in 1880, a piece of pure iron was discovered under its base, which was estimated to have been situated there over 1,900 years. Tools made of iron and steel by the ancients more than 3,000 years ago are preserved in the museums at Rome, Berlin, London, Paris, and other cities of Europe.

After the decline of Rome, Spain became noted for the production of iron and steel, the most extensive furnaces being located in the province of Catalonia, in the north of Spain, whence the Catalan furnace was named. The Catalan furnaces are still used for low blast, and serve a useful purpose where iron ore is pure. With the discovery that all ores can not be melted in Catalan furnaces, it became necessary to construct higher furnaces, with an opening at the top into which the ore is thrown. This is the form of structure utilized in modern blast furnaces, and their invention dates from the early part of the 14th century, when a native of Germany introduced this form and utilized it extensively for the production of iron from ore secured in the Rhine provinces. These furnaces were introduced into France in the middle of the 15th century and into England about the same time. Coal did not come into general use in blast-furnaces until 1713, charcoal being used previously, but it did not serve to supply sufficient heat. The imperfectly worked iron ore left in Britain by the Romans supplied materials for some of the furnaces for nearly 300 years, being rendered of value because of the increased heat of coal and coke. In 1585 iron deposits were discovered in North Carolina by an expedition sailing under Sir Walter Raleigh. The iron first used in America was smelted in Europe, but attempts to manufacture began in Virginia as early as 1619. No material progress was made till 1643, when blast-furnaces were built near Massachusetts Bay, at the present site of Lynn, and bog ore still found there was used. Among the valuable improvements in the manufacture of iron may be mentioned those of Cort, who in 1783 secured a patent for rolling and in 1784 for puddling. Dalton discovered the hot blast in 1827, and Bessemer, in 1856, discovered the process of converting crude iron into manufactured iron and steel.

The iron deposits of the United States are very extensive, and the production of pig iron is the most important in the world. Nearly every state has iron deposits, though

there are some districts in which it is especially abundant. The most productive iron fields operated at present are those of the Lake Superior region, from which about two-thirds of the iron ore is obtained. Other vast deposits are in Pennsylvania, Ohio, Alabama, Tennessee, Virginia, and Missouri. Pennsylvania leads in iron manufacture, but Minnesota ranks first in its production. The highly productive deposits of that state are in the Cornwall Hills, where some of the most remarkable deposits of the world occur. In 1688 the first blast-furnace of Pennsylvania was operated under the direction of William Penn, and in 1817 the first rolling mill was established at Plumstock, Penn. The iron industry of the southern states is making rapid progress, owing to the vast iron ore and coal deposits in that region, while marked attention is also directed toward the industry in the states of the west.

The annual average of pig-iron produced in the United States is about 14,500,000 tons, and that of steel 12,500,000 tons, of which about seven-tenths is manufactured by the Bessemer process. England and Germany are the most extensive producers of iron in Europe, the production of England being 10,500,000 tons and that of Germany 10,580,000 tons. Other countries producing iron extensively are Austria, France, Russia, Belgium, Sweden, and Norway. The finest grade of iron produced in Europe is taken from the mines at Danemora, Sweden, and is used extensively for horseshoe nails. These mines have been operated continuously since the 15th century and are inexhaustible. The manufacture of all forms of machinery and utensils and the construction of large buildings have increased remarkably the demand for iron and steel. There are few machines now produced that do not consist largely of these metals. The impetus of railroad building in Africa, Asia, South America, and Australia has greatly increased the foreign demand for the American product, and is also tending to develop on a large scale the output of native products in those regions.

IRON AGE, a term used to indicate the degree of civilization and culture of a people considered from the material of which their tools and weapons are made. The three prehistoric stages are known as the ages of stone, bronze, and iron. This succession in the use of tools and weapons was not followed universally in every part of the world. In some portions, as in America, Africa, and islands of the South Pacific, the natives passed directly from the use of stone to iron. The age of iron began in Greece in the time of Homer, the Homeric poems alluding to the transition from bronze to iron. From the southern portion of Europe the age of iron moved northward. It reached Scandinavia about the period of the Christian era, and became fully established about the year 800 A. D., when those peoples were converted to Christianity. In the stone age implements and weapons were cut from native rock; in the bronze age they were cast, and in the iron age they were hammered into shape and ornamented by curved lines. The iron age was also attended by the introduction of alphabetic characters, by which a basis was laid for history and literature. The present time is often spoken of as the age of steel, and sometimes as the age of electricity.

IRONCLAD VESSELS, the naval vessels that are protected from the fire of the heavy guns by iron or steel plates. Ironclad vessels are of comparatively modern invention, and were first tried on some of the French floating batteries at Kinburn in 1855. The experiments were not satisfactory until 1858, when the French vessel La Gloire was constructed, and the following year Britain began to introduce armor-clad vessels into the navy. Since then marked improvements have been made, and war vessels have taken on a powerful and secure form. The first test of a protected vessel in actual military contact occurred in the Civil War, when the Confederates covered the Merrimac with railroad rails and other heavy irons, naming it Virginia, and in this way succeeded in damaging the Union navy. This was followed by the invention of the Monitor, a protected turret ship, by Ericsson, and from it resulted an entire revolution in naval warfare. The first ironclads were constructed of wood with steel or iron plates protecting the entire exposed surface, but at present iron and steel enter extensively into the general construction, while the firing from them is done through port-holes, or from central turrets or citadels. The plate formerly used was from three to five inches thick, the thinner being near the bow and stern, but those of more recent manufacture have armor from fifteen to forty inches in thickness on the sides, and a deck-plate from two to four inches thick. The most important manufactories of armor plate are located at Essèn, Germany, known as the Krupp works. The United States has been coming rapidly to the front as a naval power, and has some of the finest first-class armored vessels of steel and iron in the world. Other nations possessing important ironclads are Great Britain, Germany, France, Russia, and Italy. The navy of Great Britain is the most extensive, while Italy has two of the largest ironclads in the world, the Lepanto and Italia, each having a displacement of 13,840 tons.

IRON MASK, The Man with the, a term used in French literature, and by which the brother of Louis XIV. is known. It is related that he became angry and boxed the ears of the grand dauphin, on account of which he was imprisoned for life. He is spoken of by Voltaire as a prince of noble appearance, and it is related that an iron mask concealed his face when transferred from one prison cell to another. In the later years of his life he was confined in the

Bastille, and there was shown distinctive favors. According to some writers he was the half-brother of the grand dauphin, son of Louis XIV.

IRON MOUNTAIN, a city in Michigan, county seat of Dickinson county, near the Menominee River, about fifty miles west of Escanaba. It is surrounded by a country fertile in soil and rich in the deposit of vast quantities of excellent iron ore. Near it is the noted Chapin mine and others equally important. The city has a fine courthouse. It is the focus of several railroads, giving it connections with the trade cities of the central west, and has a growing commerce. There are street railways, sewerage, pavements, electric lighting, waterworks, and many fine schools and churches. Population, 1904, 8,585.

IRON MOUNTAIN, or **Iron Mount**, a famous hill in St. Francois county, Missouri, which covers 500 acres and rises to an altitude of 300 feet above the surrounding country. Its iron ore yields from 50 to 65 per cent. of good iron. The iron deposit seems to be inexhaustible, some of the deposits being fifty feet thick and of unknown depth. Near it is Iron Mountain, a village having important railroad connections and containing blast-furnaces and factories.

IRONTON (ī′ŭrn-tŏn), a city in Ohio, county seat of Lawrence county, on the Ohio River, about thirty miles above Portsmouth. The city is an important railroad junction, is surrounded by a fertile agricultural country, and near it are extensive deposits of iron ore and bituminous coal. Among its institutions are foundries, furnaces, rolling mills, and manufactures of stoves, boilers, nails, machinery, and furniture. The school system is well established. There are numerous churches and modern municipal facilities, including gas and electric lighting, street railways, pavements, and waterworks. Population, 1900, 11,868.

IRONWOOD, a city of Michigan, in Gogebic county, on Montreal River, and extensively connected by important railroads. The iron industry is the most important enterprise, its mines yielding large quantities of rich ore. There are manufactures of cigars, ironware, machinery, furniture, and utensils. It has a large trade in merchandise. The surrounding country is fertile, and is included in the rich Gogebic iron range of Michigan and Wisconsin. There are modern municipal facilities, street railways, good schools and churches, and a public library. Population, 1904, 10,019.

IROQUOIS (ĭr-ō-kwoi′), or **Six Nations**, a celebrated confederation of North American Indian tribes. They were first known as the Five Nations, which included the Mohawks, Onondagas, Senecas, Oneidas, and Cayugas. In 1712 they were joined by the Florida Tuscaroras, when the union became known as the Six Nations. They carried on extensive hostilities against the French in the 17th century, when they numbered about 15,000, but suffered severe losses. Subsequently they became allied to the Dutch, later to the English, and afterward joined Pontiac. A peace concluded was broken in 1774, but another treaty was made in 1784 with the United States, and the greater portion moved across the lakes into Ontario. In the War of 1812 the American and Canadian branches were pitted against each other, but at the close of that war a lasting peace was restored. At present the Iroquois number about 12,000, many of whom have embraced Christianity and become advanced in educational arts. The larger part of those in the United States are in New York, Wisconsin, and Indian Territory. Their most distinguished men include Brant, Cornplanter, and Red Jacket.

IRRAWADDY, or **Irawadi** (ĭr-rä-wäd′-dȳ), an important river of southern Asia, rises in the Himalaya Mountains, has an almost southern course of 1,200 miles, and flows by an extensive delta into the Bay of Bengal. The river valley is exceedingly fertile, and the navigation facilities far superior to those of the Indus and Ganges. During the Burmese wars it furnished the chief means for British advancement, and now carries the bulk of the trade through central Burmah. The cities on its banks include Mandelay, Rangoon, Ava, and Prome.

IRRIGATION (ĭr-rĭ-gā′shŭn), meaning in Latin "watering," a system by which the fertility of soils is produced or increased by

IRRIGATION CANAL.

supplying an adequate amount of water for the production of crops. The term is also applied to a system of periodical inundation, whereby the fertility is increased. The cultivation of lands under a method of irrigation is one of the oldest of industries, and was utilized extensively in prehistoric ages in regions where natural rainfall was insufficient. It was practiced extensively in Egypt more than 2,000 years before the Christian era, when great artificial lakes and canals were built for the purpose of conducting the water across the barren and otherwise unproductive surface to the tracts containing elements of fertility. The same system was in common use among the peoples of Persia, India, China, Mesopotamia, and other eastern countries having an arid climate. In New Mexico and Arizona, as well as other portions of the United States, are traces of vast systems of irrigation of ancient times, but many of these regions have changed

materially by the water supply becoming exhausted, rivers drying up entirely or being lowered in their channels to such an extent that the irrigated regions are left far above and remote from the former source of water. In the Salt River valley of Wyoming are remains of former irrigation systems that have been followed more or less by modern canals, and the leveling performed centuries ago by forgotten races is still a source of utility. Old as the industry is, there have been few changes from the methods employed in remote times.

In the western portion of the United States are large tracts of land where rainfall is not sufficient for the production of crops, and formerly served only for pasture lands. Much of this region has been redeemed by irrigation; other tracts may be, but there are vast districts that do not have a sufficient supply of water and can never be redeemed. In many portions of Arizona, Idaho, Colorado, California, Oregon, Utah, Washington, Montana, New Mexico, Nevada, and Wyoming much value has been added to lands by irrigation. In some regions the water supply is drawn from rivers, while in others vast reservoirs are maintained to catch the water coming from melting snows, and this is distributed by means of canals at the proper season. In the western portion of North and South Dakota, Nebraska, Kansas, Oklahoma, and portions of Texas the rainfall is sufficient at certain periods, and irrigation is provided when there is less than the usual amount of rainfall. In some states, particularly in South Dakota, irrigation is effected to a considerable extent from artesian wells. In portions of South Carolina, Georgia, Texas, and other states irrigation takes on the form of inundation, which serves in the production of rice. Many of the states where irrigation is practiced contain a large extent of lands productive without irrigation, as for instance, Nebraska, Kansas, California, Oregon, and the Dakotas. The total amount of land redeemed by irrigation in the United States aggregates 5,500,000 acres, and the cost varies from $2 to $13 per acre annually. However, under a good system of irrigation crop failures are practically unknown, thus making the investment small as compared to the increase of profits.

IRTISH (ĭr'tĭsh), a river of Asia, the most important tributary of the Obi. It rises in the Altai Mountains, and after a northwesterly course of 1,625 miles joins the Obi near Samarova. The valleys of the upper Irtish and its tributaries are among the best cultivated and well populated districts of Siberia, and through them passes the great transcontinental railroad.

IRVING (ēr'ving), **Henry**, formerly John Henry Brodribb, celebrated actor, born in Keinton, England, Feb. 6, 1838. He studied in London, became a clerk, and in 1856 made his first appearance on the stage at the Sutherland Theater, London. Subsequently he played three years at Edinburgh, then returned to London, and later remained for five years at Manchester. His mark of distinction was made in 1870, when he took the part of Mathias in "The Bells," from which his career as a distinguished actor begins. Irving became distinguished on account of his excellent voice and gesture, and from the fact that he elevated the drama by artistic performances. In 1874 he produced Hamlet for 200 nights consecutively, and about 1885 added Macbeth, Othello, Richard III., and other Shakespearean plays. About that time he became associated with Ellen Terry and presented with much effect Tennyson's "Queen Mary" and later Goethe's "Faust." He visited America for the first time in 1883 and subsequently made several visits, in all of which he was received with marked enthusiasm. Besides writing a number of addresses, he published several papers in the "Nineteenth Century" and wrote an introduction to Pollock's translation of Diderot's "Paradox of Acting." Queen Victoria knighted him in 1894.

IRVING, Washington, celebrated author, born in New York City, April 3, 1783; died at Sunnyside, Nov. 28, 1859. When sixteen years of age he began to study law in an office, preferring this to regular college work on account of delicate health. His father, William Irving, possessed a choice library, to which young Irving was warmly attached, and found particular delight in studying the works of Chaucer and Spenser. His first essays appeared over the signature of Oldstyle, and were published in a paper called the "Chronicle," edited by his brother Peter. He sailed for the south of France in 1804 for the purpose of recuperating his health, and while on his sojourn of two years in Europe visited Italy, Belgium, Holland, and other countries, during which time he met Allston, Mrs. Siddons, and Kemble. Returning to America in 1806, he was admitted to the bar, but, as the practice was not according to his taste, engaged in writing and contributed to a periodical called "Salmagundi." In 1809 he published "Diedrich Knickerbocker's History of New York," a production read extensively on account of its genial humor. Subsequently he formed a partnership with his two brothers in a business venture, but while in England, in 1815, the enterprise failed, and he decided to devote himself wholly to literature, for which purpose he settled in

WASHINGTON IRVING.

London. While there he began work on the "Sketch Book," sending installments to be published by Van Winkle at New York, but later he sold the entire work for $2,000 to Murray, a London publisher, who bought it on the recommendation of Walter Scott. Among the "Sketches" are "Westminster Abbey," "Rip Van Winkle," and "Legend of Sleepy Hollow," all of which still remain popular. While Alexander H. Everett was American minister to Spain, he invited Irving to study Spanish history, from which resulted his "Alhambra;" "Conquest of Granada;" "History of Columbus," and "Life of Mahomet." He became secretary of the American legation in England in 1829, and in 1832 returned to New York City, where he was received with a public banquet by the citizens. In 1842 he was appointed minister to Spain by President Tyler, at the instance of Daniel Webster, and returned to America in 1846. Shortly after he established his home near Tarrytown on the Hudson, a region of which he wrote extensively. His home was called "Sunnyside." There he spent the closing years of his life with his nieces, but remained busy until the time of his death. Irving ranks among the most noted authors of America, taking a high place because of his graceful language and wide sympathies. Among the writings not mentioned above are "Crayon Miscellany," "Adventures of Captain Bonneville;" "Life of Oliver Goldsmith," and "Life of Washington." His "Life and Letters" was published after his death.

ISAAC (ī'zak), meaning "He will laugh," a patriarch of the Hebrews, son of Abraham and Sarah, half-brother of Ishmael, and father of Jacob and Esau. He was so named because of the joy that his birth occasioned. From Genesis we learn that he was born when Abraham was a hundred and Sarah ninety years of age; that he escaped miraculously when offered as a sacrifice; that his wife, Rebecca, occasioned his blessing to be given to Jacob instead of Esau, and that he died blind at Hebron when he was 180 years old. His place of burial was in the cave of Machpelah, where also Abraham, Jacob, Sarah, and Rebecca were buried. In Jewish history he occupies a less prominent place than either Abraham or Jacob.

ISABELLA OF CASTILE (ĭz-a-bel'a), queen of Spain, daughter of King John II. of Castile and Leon, born April 23, 1451; died Nov. 26, 1504. She was married to Ferdinand V., king of Aragon, in 1469, and on the death of her brother, Henry IV., became queen of Castile and Leon in 1481. Though proud and ambitious, she possessed personal charms, remarkable beauty, and a winning grace. It was her habit to attend council meetings, and she demanded that her name appear on public documents with that of Ferdinand. In the management of public affairs she was prominently connected with the introduction of the inquisition in 1480, and the discovery of America by Columbus in 1492. To aid in the expedition contemplated by Columbus she pledged her jewels to secure the money, and to her is given the honor of making possible the enterprise that led to the discovery of the new world. She was also instrumental in expelling the Moors after the conquest of Granada, and at her death required Ferdinand to confirm by an oath a promise never to marry again. She is mentioned frequently in history as Isabella the Catholic, from the circumstance that every action of her life was colored by piety.

ISABELLA II., Maria Isabella Louisa, ex-queen of Spain, born in Madrid, Oct. 10, 1830. Her mother, Maria Christina, induced her father, Ferdinand VII., to establish female succession, and at his death on Sept. 29, 1833, Isabella became queen of Spain under the regency of her mother. Her uncle, Don Carlos, claimed the throne, on account of which a civil war resulted, and after seven years the cortes exiled Don Carlos and his adherents and recognized the claims of Isabella. She became queen in fact on Oct. 15, 1843, and three years later married her cousin, Don Francisco d'Assisi. Among the events of her reign are the negotiations with the United States for the purchase of Cuba; political differences with Chile and Peru; war with Morocco, and the annexation to Spain of Hayti and St. Domingo. A revolution broke out against her government in 1868, which was followed by the formation of a republican government and Isabella fled to France. On June 25, 1870, she renounced her claim to the throne in favor of her son, Alfonso, who became king in 1874. Isabella returned to Spain after remaining an exile for eight years.

ISAIAH (ī-zā'yà), meaning "salvation of God," son of Amoz, and the most noted of the Hebrew prophets. His prophesies began in the reign of Uzziah and continued through those of Jotham, Ahaz, and Hezekiah, about 740 B. C. The history of his life is not known, but it is certain that he exercised a wide influence among the people of Judah and over the kings. It is thought he died when nearly one hundred years old, shortly after Manasseh became king. His early writings threatened judgments upon the sinful, and the latter portions predict a glorious future for Israel.

ISCHIA (ĭs'kē-ä), an island celebrated in history, situated about six miles west of Italy, near the Bay of Naples. It is of volcanic origin, contains many thermal springs, and is noted for its beautiful climate and production of excellent wine and fruits. The area is twenty-six square miles, and the population 30,000. Among the chief industries are fruit culture, fisheries, and the entertainment of many tourists who visit it annually. Ischia is the capital and most important city, having a population of 7,000, and other towns are Forio and Casamicciola. Earthquakes are not infrequent,

the most important of recent date occurring in 1883, when about 5,000 persons were killed. In the city of Ischia is a picturesque castle built by Alfonso I. of Aragon, in the 12th century.

ISHMAEL (ĭsh'ma-el), meaning "God will hear," son of Abraham and Hagar. His mother was an Egyptian who served as handmaid to Sarah. When the youth was fifteen years of age, he and his mother were expelled from the house of Abraham. Subsequently they dwelt in the southern part of Palestine, where Ishmael married an Egyptian woman and reared a family of twelve sons and one daughter. Since it is foretold in the Scriptures that Ishmael would become a great nation, it is thought that the Arabs descended from him. Mohammed claimed him as his progenitor, and in the 10th century the name of Ishmaelites was assumed by a secret society of Mohammedans in Syria.

ISHPEMING (ĭsh'pĕm-ĭng), a city of Michigan, in Marquette county, on Lake Superior, about fifteen miles west of Marquette. It is conveniently connected by railroads with many other trading centers. The city is noted because large quantities of red hematite iron ore are mined in the surrounding country. Among its manufactures are ironware, clothing, carriages, cigars, machinery, steam boilers, and utensils. The public school system carries a fine course of study. Among the municipal facilities are electric lights, pavements, a public library, and an extensive system of street railways. There is a considerable jobbing trade. Population, 1904, 11,623.

ISINGLASS (ī'zĭn-glȧs), the popular name of mica, a mineral of a metallic luster found in large deposits, and remarkable for its tendency to split easily into thin, transparent, elastic plates. It is used as a substitute for glass in windows in Mexico, Siberia, and some countries in South America, and for lanterns, having the property of bearing sudden and marked changes in temperature without breaking. In the manufacture of stoves it is used for ornamental portions. It constitutes a valuable substitute for glass on war vessels, since it is not easily broken by the jar from cannon discharges. Isinglass is also the name of a gelatinous substance made from the bladder of various kinds of fish. The best quality is secured from the sturgeon, but the American product is made largely of various parts taken from the cod, hake, and other fishes. The purposes for which it is used include the manufacture of glue, court-plaster, a cement for glass and porcelain, and for refining sherries and white wine. It likewise serves for stiffening silks, linens, gauzes, and other textiles.

ISIS (ī'sĭs), the sister and wife of Osiris, and considered the principal goddess of the Egyptians. She was worshiped as the personification of the moon, as Osiris was of the sun. The Egyptians regarded her the earliest teacher of agriculture and offered her the first ears of the field in practically the same way that the Grecians honored Ceres. In statuary she is represented with the horns of a cow, but the form of a graceful woman, and sometimes holds in her hand the sistrum, an instrument used by the Egyptians in the worship of the gods. Her worship began at Memphis, later became popular throughout Egypt, and ultimately was introduced by Sulla, in 86 B. C., among the Romans. In Egyptian mythology she was regarded the principal figure, and to her is attributed the annual overflow of the Nile, the disappearance of the waters from the Phædrus River, and a queenly reign among the gods.

ISLE OF PINES. See **Pines, Isle of.**

ISLES OF SHOALS, a group of eight small islands off the coast of New Hampshire, about ten miles southeast of Portsmouth. They are inhabited by fishermen and are noted as a favorite resort for bathing, fishing, and general recreation. On Star and Appledore islands, containing 150 and 400 acres respectively, are a number of hotels for summer visitors, and on White Island is a revolving light eighty-seven feet above the sea. There is a daily connection by steamer from Portsmouth. Champlain discovered these islands in 1605 and they were visited by Captain Smith in 1614.

ISMAIL PASHA (ĭs'mȧ-eel' pȧ-shȧ'), khedive of Egypt, born in Cairo, Egypt, in 1830; died March 2, 1895. He was the second son of Ibrahim Pasha, grandson of Mehemet Ali, and secured a liberal education in Paris. He returned to Egypt after the death of his father, and in 1856 engaged with Said Pasha, viceroy of Egypt, to fill various missions at European courts. In 1862, when Said Pasha visited Europe, he was entrusted with the administration, and in 1863 became viceroy, on account of the death of Said Pasha. The Civil War in America made it possible for him to acquire vast wealth by the production of cotton, and by means of it he became freed from Turkish supervision and assumed the title of khedive. The construction of the Suez Canal had his vigorous support, largely because he considered it of value to Egyptian commerce, and in 1866 he formally opened the first Egyptian parliament. Later he undertook internal improvements, such as the building of railroads and telegraphs; the construction of lighthouses, highways, bridges, and telephones; and also succeeded in suppressing the slave trade. These progressive movements occasioned an increase in taxation and in consequence an opposition by the people, on account of which he abdicated in 1878 in favor of his son, Tewfik Pasha, who became Tewfik I. Ismail foresaw the opposition against him, accumulated a large fortune abroad, and in 1879 left Egypt. In 1886 he visited Constantinople, where he was detained in captivity for a period of years.

ISOCRATES (ī-sŏk'ra-teez), celebrated orator of Greece, born in Athens in 436 B. C.; died in 338. His father, Theodorus, provided for him the most liberal education that the schools of Athens afforded. His voice was weak and his inclinations timid, but he attained to much renown as a writer of orations and a teacher of rhetoric, by which means he obtained positions of wealth and influence. Though not personally connected with political strifes, he was a sincere patriot and labored earnestly for the honor and independence of his country. In 392 B. C., he founded a school at Athens, where he continued to teach and write, and to influence the thought and oratory of the most brilliant men of Greece. The battle of Cheronæa terminated unhappily for his country, on account of which he became broken-hearted, and after abstaining from food several days died from grief. He was a friend of Plato, and wrote orations that compare favorably with those of Demosthenes, twenty-one of which are extant.

ISOTHERMAL LINES (ī-sō-thĕr' măl), the lines on a globe or map passing through places in which the mean temperature is the same. The first observations and collection of facts bearing on isothermal lines were made by Humboldt. Isochimenal lines are drawn over places in which the winter temperature is the same, and isotheral lines are used to designate places having the same mean summer temperature.

ISPAHAN (ĭs-pa-hän'), an ancient city of Persia, capital of the province of Irak-Ajemi, on the Zendarud River, about 210 miles south of Teheran. For centuries it was the capital of Persia and is still an important commercial center of the interior. It is situated in a fertile valley, has many historic buildings, and several well improved streets. Its trade, though large, is carried on largely by caravans. There are manufactures of cotton, woolen, satin, and velvet goods, glass, firearms, earthenware, brassware, sword blades, pottery, and trinkets. The surrounding country produces large quantities of tobacco, opium, and cereals. Ispahan attained to much power during the reign of the caliphs of Bagdad. It was captured by Timour in 1387. In the 17th century it contained a population of about 900,000. The capital was removed to Teheran in 1722, after Ispahan had been ravaged by the Afghans. It is now the seat of the high priest and the religious center of Persia, containing many institutions of educational importance. Population, 88,581.

ISRAELITES. See Jews.

ITALY (ĭt'a-lĭ), a kingdom of Europe, comprising chiefly the middle peninsula of the three that project from the southern coast of the continent. Besides this, it includes the islands of Sardinia, Sicily, Elba, and about sixty-five others of more or less importance. The total area is 110,623 square miles, and the population 32,882,318. Its length from Sicily to the Alps is about 690 miles, width 350 miles. The boundary line is formed by the Alps on the north, and the Mediterranean and Adriatic seas form the principal portion of the other boundaries. The Apennine Mountains traverse centrally the entire peninsula and attain to heights of from 10,000 to nearly 14,000 feet above sea-level. In the vicinity of Naples the Apennines are a little less than 10,000 feet, and in the northern portion the greatest height is 13,650 feet. Much of the mountain scenery is picturesque, the vegetation abundant, and many of the valleys are remarkable for beauty and fertility.

Many of the mountains of Italy are volcanic. Of these Mt. Stromboli, in the Lipari Isles, is of much historic interest. Others equally noted are Ætna in Sicily, and Vesuvius near Naples. The rivers include the Po, Twina, Adige, Reno, and Tiber, but the river navigation is confined to the smaller vessels. Many beautiful lakes are located in the northern portion, among them Lake Como, Garda, Maggiore, and Bolsena. Extensive canals are utilized to irrigate the drier regions and to carry on commercial intercourse. These are especially elaborate in Piedmont, where 250 canals connect the different trade emporiums and have for many centuries been a source of profit in agricultural arts and commerce. The railroad system is connected with France and Switzerland by tunnels through St. Gothard and Mont Cenis. Its climate is very healthful in many portions, though in others quite unfavorable to longevity. The winters are moderate, the summers quite temperate, and the autumnal season famed for its fine aspect and bracing air. Some districts in the southern part are subject to drought.

Agriculture is the principal occupation in Italy. Fully 72 per cent. of the land is productive, and this is held under three classes: peasant proprietorship; a form of co-operative partnership, and a system of rent. The principal agricultural products include flax, wheat, rye, cotton, maize, rice, tobacco, hemp, and many varieties of fruits. Silk culture is carried on in nearly all portions of Italy, but flourishes most extensively in Piedmont and Lombardy. The live-stock reared includes principally cattle, sheep, swine, goats, and horses, of which cattle and sheep are the most abundant. Coal and iron are mined, but the supply is not adequate for the demands of manufacture. There are extensive deposits of lead, copper, zinc, sulphur, manganese, antimony ores, alum, salt, and some silver and gold. Railroad connections abound most largely in the northern and western portions, though there are lines in all portions and also in the different islands. At present the railway lines aggregate 12,500 miles, about one-half of which are owned by the government. The absence of extensive fuel resources has made it impossible for Italy to develop rapidly as

a manufacturing country, much of its coal supply being imported. There are manufactures of machinery, cotton and woolen goods, glass and ceramics, flour, paper, pottery, silk goods, hats, tobacco, and utensils. Germany is the most extensive consumer of Italian productions, and its trade with Egypt is also considerable. The imports consist largely of cotton, coal, timber, machinery, food stuffs, and tobacco; the exports comprise fruits, wine, sulphur, olive oil, silk, and hemp. Its foreign trade is largely with France, Germany, the United States, Great Britain, Austria, Russia, Canada, and Egypt.

The educational affairs are under a minister of public instruction. In most of the different parts of the kingdom there is compulsory attendance, but the law is not efficiently enforced and the per cent. of illiteracy is considerably larger than in the countries of northern Europe. Within recent years education has made rapid progress among the people, but in the southern part of the kingdom illiteracy is practically general. However, the higher institutions are efficient. There are twenty-one universities, some of which have been celebrated many centuries for efficient work, especially those at Pisa, Padua, Genoa, and Palermo. The kindergarten system is modeled after that of Germany, and there are also night-schools, Sunday-schools, normal schools, gymnasia, colleges, and an extensive system of private educational institutions. Roman Catholic is the dominant religion, the pope residing at Rome. Protestants and Jews constitute only a small portion of the people, but the exercise of religion is free to all. The army consists of a permanent force, a mobile militia, and a territorial militia. Its entire military strength is 3,225,000, but the numbers permanently with the colors aggregate 325,000. Its navy is not important compared with those maintained in other European countries, but is gradually assuming strength. The postoffice and telegraph systems are widely established and newspapers are gradually making their way into the homes.

The government of Italy is a constitutional monarchy. The right to vote is restricted to citizens twenty-one years of age, and to those who can read and write and pay nineteen lire in taxes annually. Legislative authority is vested in a parliament of 338 senators and 568 deputies. General executive power is vested in the king, whose office is hereditary. He is assisted by a ministry of eleven departments. The departments include the ministry of justice, war, the interior, the navy, the treasury, finance, foreign affairs, instruction, agriculture, public works, and posts and telegraphs. Rome, on the Tiber, is the capital. The largest cities are Naples, Rome, Milan, Turin, Palermo, Genoa, Florence, Bologna, Messina, Venice, and Ravenna.

The history of Rome (q. v.) includes the early history of Italy. Prior to Roman supremacy Italy was peopled by various Italian tribes, including the Etruscans, Oscans, Latins, Umbrians, and Sabines. Of these the Latins attained to the greatest power and gave their language and name to the people. At present there are few traces of the first inhabitants. In the northern part the Germanic element is mingled, while in the southern are descendants of former Greek colonists. At present the people of Italy partake of the characteristics of the early Romans, Gauls, and Germanic peoples. The history of Italy proper begins with 476, when Rome fell under the invading Heruli, barbarian tribes that proclaimed Odoacer king of Italy. Theodoric the Great, king of the Ostrogoths, obtained possession in 493, and by wise administration gave Italy a more wholesome government than had been experienced since the first decline of Roman prosperity. However, the Eastern emperor, Justinian, vanquished the Ostrogoths in 552, and Italy was governed from Constantinople, where the Eastern Empire had existed since 395. The Germanic Lombards secured dominion in 568, and in 800 Charlemagne became the recognized ruler of Italy.

The Carlovingian dynasty gave eight kings to Italy, and in 951 Otto, king of Germany, reduced Berengarius II. to vassalage and ten years later was crowned king of Italy and emperor of Rome. For more than two centuries German kings governed Italy, and numerous wars for supremacy took place periodically between the popes, emperors, and the independent cities, and at that time rose the famous contest between the Guelphs and Ghibellines. Frederick Barbarossa, the emperor, stipulated a six years' peace at Venice in 1177, and concluded a treaty with the Lombard towns in 1183. The municipalities of Genoa, Venice, Milan, and Pisa flourished during this period, and Venice became the supreme power in the Levant, after the capture of Constantinople. The popes became temporal sovereigns of Rome in 1278, and an effort made by Henry VII. to restore German supremacy was defeated in 1312 by the Guelphs. Three years prior to this, in 1309, the papal seat was established at Avignon, and from there the papal power was exercised for seventy years. The history of Italy ceases in the 14th century, when five powers controlled the country and continued to hold supremacy until about the end of the 15th century. These five powers included the republics of Venice and Florence, the duchy of Milan, the kingdom of Naples, and the papacy.

In Florence arose the Medici family, which by its wealth and sagacity had almost absolute sway, and in 1525 the battle of Pavia gave the German emperors appointive power over several of the states. With the rising power of Florence was exemplified the influence of Savonarola, under whose activities political opinion was influenced largely. Within the 16th century the rival armies of

different claimants struggled for supremacy, particularly those of Charles V. of Germany and Francis I. of France, by which the papal influence gained in strength. Francis I. was expelled from Italy and Rome overrun in 1527. Two years later Charles V. attained supremacy by the peace of Cambrai, and his son Philip was recognized undisputed sovereign by the treaty of Cateau-Cambresis. The establishment of the Jesuits and the inquisition strengthened the papacy, and in 1684 Venice conquered the Peloponnesus. However, the peace of Utrecht, in 1713, gave Austria supremacy in Milan, Naples, and Sardinia. After prolonged wars the condition of Italy was one of apathy, its spirit of nationalism remaining crushed until the rise of the French Revolution, when it began to take on new life.

In 1796 Napoleon invaded Italy, gained the battle of Marengo in 1800, and five years later was crowned king. Soon after several districts were annexed, and in 1806 Joseph Bonaparte became king of Naples and two years later was succeeded by Murat. Napoleon held undisturbed sway in Italy until 1814, when Murat and Austria coöperated against Napoleon, but Murat was dethroned and by court-martial sentenced to death. In 1815 the congress of Vienna restored Italy to its former state: the house of Savoy received Sardinia; the Hapsburg-Este family secured several principalities; the wife of Napoleon, Maria Louise, received Parma; Lucca was given to the duke of Parma; the Austro-Lorraine dynasty received Tuscany; the pope was restored in the papal states; the Bourbons received Naples, and Monaco and San Marino secured independence.

These conditions existed more or less undisturbed until the revolution of 1848, which broke out in Milan and Sicily, and the Italian people again became involved in a war for national union against foreigners. The movement received the support of the pope in the beginning, but later it was withdrawn, whereby the national cause was weakened materially. In 1849 the pope fled from Rome, a republic was proclaimed, and Mazzini became president. A French army of occupation restored the pope in 1850 and other sovereigns were restored also, making the revolution fruitless. Victor Emmanuel II., king of Piedmont, gave aid to the national cause and was supported by Cavour of Sardinia and by Garibaldi. The Austrian army was defeated on June 14, 1859, at the battle of Magenta and on June 24 at Solferino, after which the peace of Villafranca was concluded. Victor Emmanuel was declared king of Italy in February, 1861, by the Italian parliament in session at Turin.

In the war of 1866 between Prussia and Austria, Italy was allied with the former, and, after the victory at Sadowa, Venetia was annexed by treaty to Italy and about the same time the capital was removed from Turin to Florence. In 1867 the national party under Garibaldi made an attack upon Rome, but was opposed by the papal army. However, on Sept. 20, 1870, Victor Emmanuel entered Rome, this being made possible by Napoleon III. withdrawing his troops to participate in the Franco-German War, and the emancipation of Italy was assured. The pope was given a yearly donation of $622,500. He also retained possession of the Lateran Palace, the Vatican, the Church of St. Maria Maggiore, and the villa of Castel Gandolfo. Reunited Italy entered with enthusiasm upon an era of nationalism, developed internal improvements, and regained its place as one of the great powers of Europe. In 1872 destructive eruptions of Vesuvius occurred, and in 1878 Victor Emmanuel died. He was succeeded by his son, Humbert I., who ruled with success until 1900, when he was assassinated, being succeeded by his son, Victor Emmanuel III. Italy became a member of the Triple Alliance with Germany and Austria in 1883. Though financially embarrassed at various times on account of protracted wars, the finances are assuming greater stability under continued national development.

The colonial policy of Italy has been pursued with more or less vigor. Its possessions include about 647,000 square miles in Africa. Among the principal possessions are Italian Somaliland, those in the vicinity of Assab and Massowah, and portions of Abyssinia and Eritrea. The language of Italy is the Italian, which descended from the Latin. From the same source sprang the Spanish and French, but they are allied with other local elements, which make them more distinct from the Latin than the language of Italy. The German emperor, Frederick II., who ruled in Italy from 1212 to 1250, established the University of Naples and made the Italian his court language in Sicily. This circumstance may be taken as the first step to place the Italian language among those to survive the general upheaval after the Middle Ages, and soon after writers and teachers began to multiply, especially in Tuscany. By the end of the 13th century Italian, owing to its accuracy and poetic beauty, began to take precedence as the language of literature. It was greatly extended in popularity by the writings of Dante (1265-1351), who gave it the form in which it has prevailed in an almost unchanged condition until the present. The "Divine Comedy" is Dante's masterpiece, and still continues a work of much popularity. Petrarch and Boccaccio, in the 14th century, wrote works in prose that greatly improved the language in grammatical accuracy. The best known work of Petrarch is his "Parallel Lives," while to Boccaccio we are indebted for his "Decameron," a work in prose from which Chaucer, Schiller, and other subsequent writers drew much inspiration.

Florence became the great center of clas-

sic learning after the Middle Ages, but other noted centers of letters aided in extending a taste for literary work. Alberti (1406-72), an eminent poet and prose writer, is best known by his "On the Family." The great political reformer, Savonarola, added valuable orations to the literature. Aristo (1474-1533), an eminent poet, is the author of "Orlando Furioso," an epic of chivalry still popular. Among the historians of this period is Machiavelli (1469-1527), who is the writer of "Prince," a work translated into many languages. Benevenuto Cellini (1500-71) gave tone and tendency to literature by fine, artistic work, while Torquato Tasso wrote valuable dramas and poems, the latter including "Jerusalem Delivered," and to the same period also belong the painters Titian and Raphael. Galileo, in the 17th century, produced numerous scientific writings which for clearness and purity of prose gave immortality to his name. At the end of the 18th century we note the tragic writings of Alfieri, including "Agamemnon;" "Philip II.;" "Antigone," and "Marie Stuart." Vincenzo Monti (1754-1828) made an excellent translation of the "Iliad" and "Odyssey," while Carlo Goldoni (1707-93) ranks as a famous comedian, and Silvio Pellico (1788-1854) produced numerous patriotic and historical writings. Among the writers of the 19th century are Gabriele Rossetti(1783-1854), a poet of considerable renown, and the novelists Manzoni and Rosini. The historians of this period include Capponi and Balbo; the political writers, Joseph Mazzini, and the satirists, Giusto.

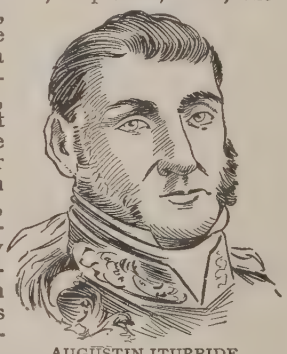
Italian literature, though quite extensive in scope and character, has hardly touched the people with as marked an impression as that of France, Germany, and England, largely because education has not been so widely disseminated within the regions where the Italian language prevails. However, with the larger encouragement of schools and higher institutions of learning there came a notable increase in interest, and the 20th century opened with prospects that before its close additions of wide scope will be made and general interest greatly extended. Among the recent writers of Italy may be named the historians Giovanni Monticolo and Vittorio Fiorini; the poets, Vittoria Aganoor and Gabriele d'Annunzio; the novelists, Matilde Searao; the dramatists, Roberto Bracco; and the general writers, Eugenio Rossi and Nicola Zingarelli.

ITCH, a contagious disease of the skin, characterized by the appearance of small pustules, irritation, and uneasiness, by which the patient is inclined to rub the affected parts. It is caused by the itch mite, a microscopic insect that burrows within the epidermis. The eggs are laid in the skin by the female, hatch in about ten days, and give rise to the disease. An application of lard and sulphur to the affected parts is a common remedy.

ITHACA (ĭth'ą-ką), a city in New York, county seat of Tompkins county, located at the south end of Cayuga Lake, thirty-six miles south of Auburn. The surrounding country is agricultural and dairying. Its municipal facilities include electric lights, a public library, waterworks, pavements, and street railways. Among the manufactures are vehicles, paper, farming machinery, flour, clocks, musical instruments, leather, glass, and firearms. Besides an extensive public school system, it is the seat of the Cornell University (q. v.). Population, 1900, 13,136.

ITHACA, now called **Thiaki**, an island of the Ionian group, situated west of Greece. It is sixteen miles long and four wide; area thirty-eight square miles. The inhabitants engage largely in agriculture, fruit growing, and marine life. Ithaca is mentioned by Homer in the "Odyssey" and contains many interesting relics. Vathi is the present capital, has a population of 6,000, and engages in commercial enterprises. The island has a population of 11,500.

ITURBIDE (e-toor-be'dă), **Don Agustin**, emperor of Mexico, born in Valladolid, now Morelia, Mexico, Sept. 27, 1783; executed in Padilla, July 19, 1824. He commanded in a revolutionary outbreak in Mexico, joined the royalist party, and became chief commander of the army in 1815. On May 18, 1822, he was recognized by the army as Emperor Agustin I., but within ten months was compelled to abdicate in the presence of a congress that he had dissolved by force. This congress refused to accept officially his abdication for the reason that such action would recognize the validity of his election, but allowed him to retire to Italy with an annual pension of $25,000. In 1824 he published a statement of his claims at London, and in May set sail for Mexico with a view of making a second attempt to become the sovereign. On July 14 he landed in disguise at Toto la Marina, where he was recognized and arrested, and on July 19 shot under orders of the state of Tamualipas.



AUGUSTIN ITURBIDE.

IVAN (e-vän'), the name John in Russian, and by which several Russian czars are known. Ivan I. was the grand duke of Moscow from 1328 to 1340. He is celebrated in history because of consolidating the power of Moscow, around which the empire formed. Upon his success is based the prosperity and power of Russia.

IVAN III., grand duke of Moscow from 1462 to 1505. His reign of forty-three years was an important period in that it facilitated

internal development, and by his influence absolute and independent power was vested in the autocracy. He married Sophia, niece of Constantine Palæologus, in 1472, and by this act opened a way for European civilization into Russia. He also claimed a right to Constantinople, since he descended from the Byzantine emperors, and adopted as his standard the two-headed eagle. Because of his skill in diplomacy, ingenuity as a law-maker, and daring in war he became known as The Great.

IVAN IV., surnamed The Terrible, first czar of Russia. He reigned from 1533 to 1584. His incumbency is divided into three periods: his rule under the regency of his step-mother, Helen Glinska; the period from majority till the death of his wife, Anastasia Romanova; and the conclusion of his reign following her death. He assumed the title of czar, a Slavonic form of Cæsar, annexed Siberia, and defended European Russia against Poland. The second period of his reign was particularly prosperous, being marked by many internal improvements and strides of progress in industries, sciences, and arts. In the latter period he showed much cruelty against those implicated in a plot by which a portion of his territory was to be annexed to Poland, and during that time large numbers were executed. This gave rise to his surname, The Terrible.

IVORY, the hard substance that constitutes the greater part of the tusks of certain animals, as the elephant, narwhal, hippopotamus, mammoth, and walrus. The value of ivory is in its elasticity, hardness, whiteness of color, fine grain, and capability of taking on high polish. Elephant ivory coming from equatorial Africa is considered the most valuable on account of its exquisite fineness, close arrangement, and frequent curvature of the tubules. The tusks of elephants commonly weigh about sixty pounds each, but some reach 180 and even 200 pounds. Ivory is useful in making ornaments, handles for knives and forks, billiard balls, pianoforte keys, and many other purposes. Ivory taken from the hippopotamus is much harder and of a clearer white than elephant ivory, and is preferred by dentists. Mammoth ivory is secured from Siberia, where it is found as a fossil of that extinct animal. Ivory black is a black powder used in painting, and is made from sawdust and shavings of ivory by burning. Different colors, such as green, red, and black, can be given to ivory by staining or dyeing. In ancient times ivory was quite as valuable as at the present, ranging in value from $200 to $350 per hundredweight, the price depending upon its purity. Solomon brought ivory from Tarshish and used it in making a throne in the temple. Ivory is mentioned by Homer. In the year 400 B. C. Phidias made statues from it, plating them with gold. Specimens of ivory used in manufacture in the times of Moses are still preserved as Egyptian relics, while in many European museums are carvings in ivory made in Nineveh and other ancient Asiatic cities. The annual ivory trade of Africa is considerable, on account of which the elephant is gradually decreasing in numbers.

IVORY, Vegetable. See **Ivory Palm.**

IVORY PALM, a plant native to South America, and valuable in commerce on account of yielding the vegetable ivory. It is palm-like, rather low growing, and occurs principally in damp localities. Its leaves are very large, different plants bear male and female flowers, and the fruit forms in clusters or drupes, often the size of a man's head. The drupes are massed together, having from five to nine nuts about as large as hen's eggs, and contain a close-grained and very hard albumen, resembling in color and texture the finest ivory. Ivory-palm albumen is used extensively in the manufacture of ornaments, buttons, umbrella handles, knobs for doors, and small trinkets, and is known as vegetable ivory. The seeds, called corozo nuts, are exported extensively from northern South America to foreign markets.

IVY, a climbing plant of the ginseng or ivy family. It is a native of Eurasia, and is cultivated extensively in the United States

IVY.
1. Ivy with aerial rootlets; 2. Five-lobed leaves.

as a climbing shrub for the walls of churches and dwellings, the stems climbing by means of radicating fibers. In the wild state the lower branches spread on the ground, and the main stems climb upon trees and other supports by means of aërial rootlets. The leaves are evergreen, surface smooth and shining and are from three to five lobed. There are various species, most of which bear greenish flowers and deep green or blackish berries. The plants attain a great age, growing to the top of high buildings, and developing stems several inches in diameter. Both the roots and leaves have medicinal properties, but they are not important. In some countries the plant serves in the

manufacture of baskets and other useful articles. The American ivy found commonly in the woods is a species of woodbine.

IXCAQUIZTLA (ēks-kä-kĕks'tlä), a town of Mexico, in the state of Puebla, about ten miles southeast of Tepada. It was the scene of an important battle between the Mexican revolutionists under General Mier of Teran and the Spanish forces under La Madrid. The town is occupied at present by the Chucon Indians, and in its vicinity are numerous remains of antiquity. The present population is 5,100.

IXION, in Greek mythology, a king of Thessaly, to whom Zeus accorded the privilege of joining the festive banquet of the gods. Taking advantage of his exalted position, he endeavored to secure the favor of Hera, by which Zeus became so incensed that he struck Ixion with his thunderbolts and commanded Hermes to confine him to Tartarus, and there bind him to a wheel that revolved perpetually in the air.

IXTAPALAPA (ēs'tah-pah-lah'pah), a Mexican town, ten miles southeast of the capital, and celebrated in early history for its splendid gardens of the Aztec emperors. There are various remains of ancient temples and altars of Aztec priests, but few traces of the large and important city now remain. Its present population is about 5,000.

IZALCO (ēs-äl'co), **Mount**, a volcano thirty-five miles northwest of the city of San Salvador, capital of the Salvador republic, Central America. It belongs to a group of extinct volcanoes, but itself is almost constantly in action, giving to the earth a trembling and rocking motion. This volcano was formed in 1770 and since then has been destructive at various times. It is one of the few incidents known to recent geographers where a mountain was formed in an open plain, and thereby changing several streams and drainage basins.

IZTACCIHUATL (ēs-täk-sē-whät'l), an extinct volcano of Mexico, situated near Popocatapetl, and somewhat east of the city of Puebla. It is covered largely with snow. Its height is 15,705 feet above sea-level.

IZUCAR (ē-zo͞o'kär), a city of Mexico, in the state of Puebla, situated in a sugar district near the volcano Popocatapetl. The name Matamoras Izucar is sometimes applied to it in honor of the Mexican patriot of that name. It has good railroad connections and is noted for its sugar market. There are several fine churches and schools, a considerable trade, and divers manufactures. Population, 13,500.

J

J, the seventh consonant and tenth letter of the English alphabet. It is classed as a palatal, its sound being that of g in gem, or of dg in ridge. Formerly it was interchangeable with i, the same character being used for both, and only recently was separated from it in English lexicons. The sound does not occur in the Anglo-Saxon, and was introduced from the French. It is used as a symbol in medical prescriptions at the end of a series of numbers, as vij=seven, viij=eight.

JACK, a mechanical or hydraulic apparatus for lifting heavy weights. The simplest form is the screw-jack, which serves to apply much lifting power, while with a hydraulic-jack a single man is able to raise ten tons one foot in a minute and a half. Jack is a nickname for John, and is also applied to a flag displayed on the end of the bow-sprit. It is employed also to describe a variety of the breadfruit tree found in the South Sea islands, which bears a large fruit, often weighing thirty pounds. The fruit is eaten extensively by the natives.

JACKAL (jăk'al), an animal similar to the dog, native to many parts of Asia and Africa. It somewhat resembles the fox and

JACKAL.

wolf, but is smaller than any of the wolves. The pupil of the eye is circular, as in the dog and wolf, but the tail is more nearly like that of the fox. Jackals live in holes in the ground, have a dirty color, and eat any kind of flesh. They come out of their places of hiding to search for food during the night, often in large packs, running down animals on which they feed. In some countries they skulk around the camps of armies where they devour the refuse matter or dig up the hastily buried dead. The jackal is easily domesticated and interbreeds with the dog.

JACKDAW, a common bird of the crow family, belonging to the genus corvus. It is smaller than the rook, has white eyes, a short bill, gray neck, and glossy-black back and wings. The jackdaw is native to Eurasia, Africa, and America. It frequents towns and cities, often building its nest in chimneys, spires, towers, or other elevated places. The female lays five or six greenish eggs, covered with dark-brown spots. Its food consists of larvæ, insects, and worms. Jackdaws, like the crows, are very social birds, being easily domesticated, and learn to imitate the human voice.

JACK-RABBIT, the name of a very large rabbit inhabiting the western states, and very seldom found east of the Mississippi River. It has large ears and is noted for its long leaps and great speed. Though gray in summer, it becomes white in winter. The jack-rabbit is sometimes confounded with the Norwegian hare, which has been introduced into the United States, but may be easily distinguished, the Norwegian hare having a much heavier body.

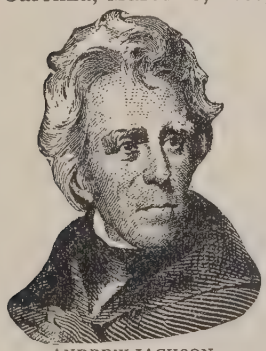
JACKSON, an important city of Michigan, county seat of Jackson county, on the Grand River, about thirty-five miles south of Lansing. It is surrounded by a fertile agricultural and fruit-growing country, has excellent railroad facilities, and is an important manufacturing and jobbing center. The manufactured products include machinery, vehicles, pumps, cigars, agricultural implements, beverages, and woodenware. The aggregate capital invested in manufacturing enterprises is $5,900,000; the annual products aggregate in value about $6,500,000, and the average number of hands employed is 3,875. There are electric street railways, electric lights, excellent schools, and several scientific societies. It has fine county buildings, a city hall, numerous churches, and is the seat of a state prison. Near the city are extensive coal mines, which supply a large portion of the fuel required in manufacturing. There is a growing trade in merchandise. Population, 1904, 25,300.

JACKSON, a city in Mississippi, county seat of Hinds county, and capital of the state. It is situated on the Pearl River, about 185 miles north of New Orleans, and is the focus of numerous railroads that penetrate the state in all directions. Among its public buildings are the state capitol, institutions for the blind, deaf and dumb, and the state penitentiary. Besides the public school system, there are Millsaps College, Jackson Collegiate Academy, and the Mary Holmes Industrial Seminary for colored girls. Its municipal facilities include paved streets, waterworks, electric lights, and a public library. Among its manufactured articles are cotton goods, farming implements, and tobacco products. The city was partly destroyed in the Civil War. It has a

large trade in merchandise, cotton, and farm products. Population, 1900, 7,816.

JACKSON, a city in Tennessee, county seat of Madison county, on the south fork of the Forked Deer River, about eighty-five miles northeast of Memphis. It is the seat of a fine public school system, the Memphis Conference Female Institute, Southwestern Baptist University, a colored female seminary, and numerous fine business blocks and private residences. Its manufactures include flour, woolen goods, ironware, ice, cigars, furniture, pottery, cotton-seed oil, and farming implements. The surrounding country is agricultural and produces large quantities of cotton, cereals, and live-stock. Numerous railroad lines give ample facilities for transporting products to distant markets. They have led to the development of a large and important jobbing trade. The city has street railways, electric lights, pavements, waterworks, numerous churches, and other conveniences. Population, 1900, 14,511.

JACKSON, Andrew, seventh president of the United States, born in Waxhaw, South Carolina, March 15, 1767; died June 8, 1845.



ANDREW JACKSON.

His father, Andrew Jackson, was an Irish Scotchman who emigrated to America in 1765 and died in 1767. His mother's name was Elizabeth Hutchinson, upon whom devolved the supervision of his early training. While it is not definitely known what schools he attended, it is certain that his early education was very limited. In 1781 he took up arms against the British, was taken prisoner, and afterward received a wound from an officer whose boots he refused to clean. Though intended for the ministry by his mother, he entered upon the study of law at Salisbury, North Carolina, in 1785, and three years later went to Nashville, Tennessee, where he entered upon the practice of law. In 1796 he served as a member of the convention which formulated the constitution of Tennessee, and in the same year was elected to congress, the state then being entitled to only one representative. He supported Thomas Jefferson for the presidency in 1796, became a United States senator in 1797, but resigned his seat the following year to become a judge of the state court of Tennessee, in which capacity he served until 1804.

Jackson took part in the Tennessee Indian wars, showing marked courage, and was appointed major-general of militia, and, when war was declared against Great Britain in 1812, he offered his services and those of 2,500 volunteers. Soon after he led a body of 2,070 men in the direction of New Orleans, but in February, 1813, received an order at Natchez by which his troops were dismissed from public service. In October of the same year he commanded a force against the Creek Indians, whom he defeated at Talladega in November. The victory at Horseshoe Bend destroyed the Creek power, while his vigorous service gave him marked popularity and led to his appointment as major-general in the regular army. In 1814 he was ordered to the Gulf of Mexico to resist an expected British invasion, where he seized Pensacola, then used as a base for British operations. In December he moved his army to New Orleans, where he gained decisive victories over the British in two engagements, and subsequently defeated them in a decisive battle on Jan. 8, 1815, in which he repulsed 12,000 British veterans with a loss of 2,600, while the Americans lost only thirteen wounded and six killed. The battle was the last of the war, and was fought fifteen days after the treaty of peace had been signed at Ghent, information of which had not reached General Jackson. He commanded in the war against the Seminoles of Florida in 1817-18, seized Pensacola, and executed Ambrister and Arbuthnot, two Englishmen who were accused of inciting the savages to hostile acts against the Americans. In 1821 he was appointed governor of Florida and two years later became United States senator from Tennessee.

The legislature of Tennessee proposed General Jackson as a candidate for the presidency in 1824. His three competitors were Henry Clay, William H. Crawford, and J. Q. Adams, but the election resulted without a choice, since none of the candidates received a majority. The electoral college gave Jackson ninety-nine votes, Adams eighty-four, Crawford forty-one, and Clay thirty-seven. Later the result of the election in the house of representatives was favorable to Adams. In 1828 the democrats succeeded in electing General Jackson to the presidency with 178 electoral votes, while Adams received eighty-three; and he was reëlected four years later. His policy in the civil service was to show a preference to the members of his own party, which was expressed by Senator Marcy, of New York, in this wise: "To the victor belongs the spoils." His prompt and decisive action in the question of nullification was an example of eminent statesmanship. The culminating event in this respect was brought about in 1832 by a protective tariff bill distasteful to South Carolina, which caused that state to pass a nullification act in which the law was declared inoperative and unconstitutional within its borders. Jackson acted promptly by issuing a proclamation in which he declared that the law would be enforced, and that state accordingly submitted. The veto of the bill rechartering the United States bank was another important act of his administration, which undoubtedly was

in the interest of the American financial policy. He retired to private life at the expiration of his term and resided at the Hermitage, near Nashville, where he died and was buried.

JACKSON, Helen Maria, authoress, daughter of Nathan W. Fiske, born in Amherst, Mass., Oct. 18, 1831; died in San Francisco, Aug. 12, 1885. She was educated at Ipswich Female Seminary, Ipswich, Mass., and in 1852 married Maj. E. B. Hunt, who died in 1863. She married William S. Jackson of Colorado Springs, Colorado, in 1875, and four years later became interested in the treatment of the Indians by the United States government. In 1883 she was appointed special commissioner to inquire into the condition of the Mission Indians in California. Her first literary productions appeared over the signature of H. H., and by 1870 attained popularity. Among her best known writings are "Century of Dishonor;" "Hetty's Strange History;" "Verses by H. H.;" "Ramona;" "Glimpses of Three Coasts," and "Bits of Travel."

HELEN MARIA JACKSON.

JACKSON, Thomas Jonathan, celebrated general, known as "Stonewall Jackson," born in Clarksburgh, West Virginia, Jan. 21, 1824; died May 10, 1863. When but three years old, his father died and left the mother to support three children by teaching school and sewing. In 1842 he was appointed a student at West Point, four years later received a commission as second lieutenant, and shortly after entered the service in the Mexican War. He resigned his commission in 1851 and became professor of military tactics and mathematics in the Virginia Military Institute at Lexington, Virginia. At the outbreak of the Civil War, in 1861, he entered the Confederate army with the rank of brigadier-general and was made major-general at the end of the year. His promotion was based upon his eminent services in the battle of Bull Run, where he also received the name "Stonewall" from an expression made by General Bee to encourage his soldiers, when he pointed toward Jackson and exclaimed: "There is Jackson standing like a stone wall; rally behind the Virginians." His military fame was still more firmly grounded by well directed movements in the Shenandoah campaign in 1862, when he showed skill superior to Banks, Fremont, and McDowell; gained the battles of Front Royal, Winchester, Cross Keys, and Fort Republic. He decided the victory at Gaines' Mill, June 27, 1862, by hastily joining Lee before Richmond. On August 9 the Federals were defeated by him at Cedar Mountain and afterward in the second battle of Bull Run. He captured Harper's Ferry in September, when he took seventy cannon and 13,000 prisoners, shortly joining Lee by a forced night's march, and gave valuable aid to the Confederate cause at Antietam. He commanded the right wing of Lee's army at Fredericksburg in December and at Chancellorsville on May 2, 1863, where success was assured by his skillful flanking movement around Hooker's right. While making a reconnaissance after the battle of Chancellorsville, he was inadvertently fired upon by his own men and received three wounds, which led to his death. Stonewall Jackson was a man of much energy, deep moral feeling, and natural bravery. His loss to the Confederate cause was greater than that witnessed in the fall of any other man, and was never replaced.

T. J. JACKSON.

JACKSONVILLE, a city of Florida, county seat of Duval county, on the St. John's River, about 150 miles southwest of Savannah, Georgia. It has street railways, well improved streets, electric lights, and is connected by numerous railroads. There are many excellent business buildings, private residences, and splendid hotels for the accommodation of invalids and visitors. Among the manufactures are cigars, clothing, packed fruit, spices, ice, and machinery. Lumber is the principal export commodity. It has a fine courthouse, city hall, theater, and a city library. The city is the largest in Florida, has a fine system of public schools, and a well improved harbor for foreign commerce. It is the seat of a large jobbing trade in fruits, merchandise, and cereals. Population, 1900, 28,429.

JACKSONVILLE, a city in Illinois, county seat of Morgan county, at the junction of several railroads, about thirty-three miles southwest of Springfield. The city is noted for its numerous educational and charitable institutions, among them the Illinois Female College, Illinois College, Jacksonville Female College of Music, and a fine system of public schools. It also contains a splendid public library, a state asylum for insane, an institution for the education of the blind, an asylum for the feeble-minded, and an institution for the deaf and dumb. The Illinois College was founded in 1839, is non-sectarian, has twenty instructors, 300 students, and a library containing 17,000 volumes. Its manufactures include flouring

mills, machine shops, and a woolen mill. There are also manufactures of ice, vehicles, draining tile, railroad cars, candy, boilers, paper, and soap. The city is beautified by paved streets, public parks, waterworks, and an extensive street car system. Population, 1900, 15,078.

JACOB, the third of the Hebrew patriarchs, being the son of Isaac and Rebekah, twin brother of Esau, and grandson of Abraham. He was a favorite of his mother, and by her suggestion secured the birthright of his brother Esau. Subsequently, to escape Esau's vengeance, he fled to his uncle, Laban. In twenty-one years he returned to Canaan with his two wives, Rachel and Leah, two concubines, and twelve sons. One of his sons, Joseph, who was a favorite of the father, was sold by his brothers and taken to Egypt. At the time of the famine in Canaan he went with his family to Egypt, where, after seventeen years, he died, about 1860 B. C., aged 147 years. His embalmed body was taken to Hebron and buried.

JACOBI (ya-ko'bee), **Mary Putnam**, celebrated physician, born in London, England, Aug. 31, 1842. Her father, G. P. Putnam, resided in New York. She pursued the study of medicine in Philadelphia, New York, and Paris, and was the first woman admitted to the Ecole de Medicine. She married Dr. Abraham Jacobi in 1873, was a dispensary physician in Mount Sinai hospital for twelve years, served as professor of materia medica in the female medical college of New York, and subsequently became professor in the post graduate medical school of New York. As a teacher and practitioner she takes high rank, while as a writer she contributed largely to medical literature. Among her publications are "Essays on Hysteria;" "Value of Life;" "Essay on Brain Tumor," and numerous papers of importance scientifically.

JACOBINS (jak'ō-bĭnz), the most celebrated political club maintained during the French Revolution. It was organized at Versailles in 1789, when it was called the Club Breton. When the national assembly was removed to Paris, it increased rapidly in numbers and importance. Gradually it grew to greater controlling power than the national assembly, and by the year 1791 had 1,200 subordinate societies. Its height of power was reached in 1792, when it was foremost in the insurrectionary movements. The Commune of Paris was originated by the Jacobins, and through Robespierre they ruled supreme until his overthrow in 1794. After the execution of Robespierre, the club was prohibited by law and its halls were closed. Extreme revolutionists and those holding radical views in politics are often designated Jacobins.

JACQUARD (zhä-kar'), **Joseph Marie**, inventor, born in Lyons, France, July 7, 1753; died Aug. 7, 1834. He descended from humble parents, who were weavers, became interested in mechanical construction at an early age, and fell heir to two looms and a small estate at the death of his father. Having little ambition to do manual work, he spent much time in devising improvements in machinery for weaving, but, owing to ill success at first, he became a lime-burner, while his wife engaged in plaiting straw. At leisure times he labored at his machines, and in 1801 secured a medal for an invention exhibited at the industrial exhibition in Paris. This invention made it possible to weave fine-figured silks much more rapidly than had been possible previously. Napoleon summoned Jacquard to Paris and for useful service awarded him a liberal pension. The manufacture and use of weaving looms were opposed by many of the laborers, though its great value in producing finer silk fabrics brought it forward and revolutionized the industry. It came into almost universal use before the death of the inventor. He secured several pensions and was granted the cross of the Legion of Honor. In 1840 a fine statue was erected to his memory in Lyons.

JAFFA. See **Joppa**.

JAGANNATHA (jäg-ŭ-nät'hä), or **Juggernaut**, meaning "Lord of the World," the name applied to the Indian god Krishna.

JAGUAR.

The term is applied also to the eighth incarnation of Vishnu and to numerous images of this deity, the most celebrated being at Puri, a city near the Bay of Bengal. The first mention of this god occurred in 318 B. C., and numerous temples and statues were erected to him at various times since. The image is wooden, has a black face, red body, gilt arms, and appears with the mouth extended and eyes formed of brilliant stones. It was worshiped on festal occasions by assemblages of pilgrims who give offerings in money, and formerly dedicated themselves in sacrifice by throwing themselves on the ground for the purpose of having the car on which the idol is mounted pass over their bodies. The deluded and confiding worshipers thought that this form of death was instrumental in conveying them into heaven. Since European occupation the practice has gone gradually into disuse,

deaths occurring at the festivals now being rather accidental than designed.

JAGUAR (jä-gwär'), the American tiger, the largest of the cat tribe. It abounds chiefly in South America, though it is found in the region south of a line drawn due west from the boundary between North and South Carolina. It has a soft, rich fur, usually yellow with large black spots, and rings with smaller black spots in them. In strength it is little inferior to the tiger, being nearly three feet high. Its limbs are large, body thick, tail long, and of nearly equal thickness throughout. The jaguar is the largest carnivorous animal native to America. Its home is in the timber, where it lives chiefly on birds, monkeys, peccaries, and other animals. It can readily climb trees and often springs upon its prey. The hide of the jaguar is valuable for footwear and gloves.

JAHN (yän), **Friedrich Ludwig**, patriot and educator, born in Lanz, Germany, Aug. 11, 1778; died in Freiburg Oct. 15, 1852. He took courses of instruction at Halle, Göttingen, and Jena, but enlisted in the Prussian army in 1805. In 1809 he studied in Berlin, became teacher of gymnastics, and made that branch of study a popular, attractive science. His establishment was attended by large numbers, and the effect upon education was lasting and beneficial. In 1814 he secured a command in the volunteer corps, entered Paris in 1815, and in 1818 was imprisoned by the government for teaching liberality in political affairs. He was elected to the national assembly in 1848 and wrote numerous works on political and social questions. The influence of his teaching of gymnastics led to the formation of turnvereins, which still prevail largely in German communities. A beautiful statue was erected to his memory at Berlin in 1872. Among his best known writings is "The German People."

JALAP (jăl'*ap*), a well known purgative medicine obtained from the tuberous root of several plants found near Jalapa, Mexico; hence its name. It grows on a tableland 6,000 feet above sea-level, and is a twining plant with large white flowers and a turnip-like root. Jalap is a valuable cathartic; but, being disagreeable and nauseous, is seldom given alone. It is very useful in some forms of dropsy, diseases of the brain, and febrile affections of children associated with constipation.

JALAP.

JAMAICA (ja-mā'ka), an important island of the West Indies, situated about ninety miles south of Cuba and one hundred miles west of Hayti, and with a number of other islands constitutes a British crown colony. Its greatest length is 145 miles; greatest width, fifty miles; total area, 4,225 square miles, while the other islands politically attached contain 224 square miles. The total population is 745,380, of which more than one-half are black, about 15,000 white, and the remainder are divided among half-breeds, Indians, and Chinese. Kingston is the capital and seat of government. Other cities of importance are Spanish Town, Montego Bay, Savannah-la-Mar, and Falmouth. Schools are maintained by government grants, and several normal schools, academies, and industrial schools are similarly supported. The interior commerce is facilitated by a number of railways, the total including about 245 miles. There are also several telegraph and telephone lines. Excellent harbors are accessible for foreign transportation. The principal exports include coffee, rum, sugar, vegetables, tobacco, and a large variety of tropical fruits; while the imports are principally fish, rice, cotton goods, and flour. There is a moderately hot climate. The year is divided into four seasons—two wet and two dry periods. In the interior of the island are several ridges and elevations about 7,250 feet high, most of which are covered with forests of logwood, mahogany, lignum-vitæ, braziletto, and other valuable varieties of trees.

Columbus discovered Jamaica in 1494 while on his second expedition to America. Several settlements were made by Spaniards in 1509. The island was taken by Cromwell in 1655, and by the treaty of Madrid ceded to England in 1670. The abolition of slavery, while proving beneficial to the moral aspect, caused a decline in its prosperity, owing to the fact that a large portion of the mongrel races are destitute of thrift. Signs of discontent on account of British occupation manifested themselves at various times, a serious revolt occurring in 1865 and another in 1899, due largely to oppressive taxation. For the purpose of relieving the laboring classes at least to some extent, the British government imposed an income tax, increased the land revenue, enlarged the stamp duties, and also placed the colony under control of the colonial office. The islands politically dependent on Jamaica include the Turks, the Cayman, and the Caicos islands.

JAMES, a river formed in Alleghany county, Virginia, by the union of the Cowpasture and Jackson streams. Its entire length is 450 miles, the course largely to the southeast, and it is navigable for large steamers to its confluence with the Appomattox, at City Point. Its largest northern tributary is the Chickahominy. The sixty miles nearest its mouth is an important estuary which articulates with Chesapeake Bay, while the James River and Kanawha Canal extends from Richmond to White Sulphur Springs. Lynchburg and

Richmond are the most important cities on its banks, while Jamestown, the first English settlement in America, is thirty-two miles from its mouth.

JAMES, or Dakota, a river of the northwestern states, rises in the east central part of North Dakota, flows south through South Dakota, and joins the Missouri about eight miles south of Yankton. The James flows through a fertile prairie country and is about 700 miles long. It is popularly called the Jim River.

JAMES, St., The Greater, son of the fisherman Zebedee, brother of John the Evangelist, and classed as one of the three greatest of the twelve apostles. He and his brother witnessed the transfiguration; the agony in the garden of Gethsemane; the restoration to life of the daughter of Jairus, and the ascension. In 44 A. D. he suffered martyrdom under Herod Agrippa, being the first of the apostles thus afflicted. He is the patron saint of Spain, and is credited with carrying the gospel to the Iberian peninsula.

JAMES, St., The Less, the eldest brother or a cousin of Jesus, called The Just in the Scriptures, and a witness of Christ after his resurrection. He wrote the epistle that bears his name; was the first bishop of Jerusalem, and spoke against those wishing to make the law of Moses binding upon Christians by a decision of the first apostolic council. He suffered death in 62 A. D. under the high priest Ananias, his death being decreed because of the rapid progress of Christianity under his preaching.

JAMES I., king of England, and VI. of Scotland, son of Mary Queen of Scots, born in Edinburgh, Scotland, June 19, 1566; died March 27, 1625. After the dethronement of his mother, he was proclaimed king of Scotland, June 29, 1567. His early training was under the guardianship of the earl of Mar, while his later education was secured under the direction of George Buchanan. He succeeded to the throne of England after the death of Elizabeth in 1603, but soon became unpopular with his English subjects. The famous Gunpowder Plot was brought about by his undue severities against the Roman Catholics, and many other evidences that he was unpopular were manifested against him. Though a well-read scholar, he was nervous, delighted in disputes, and showed distinct marks of weakness in judgment. The most noted event of his reign was the authorized translation of the Bible into the English, known as the King James Version. It was made under his patronage and at his direction.

JAMES II., king of England, VII. of Scotland, son of Charles I., born Oct. 15, 1633; died in St. Germain, France, Sept. 6, 1701. He was created duke of York in 1643, escaped to France during the civil war of 1648, entered the army of Louis XIV., and later the service of Spain. He married Anne, daughter of Lord Chancellor Hyde in 1660, avowed his conversion to Catholicism in 1671, and became king after the death of Charles II., on Feb. 6, 1685. His reign was unpopular owing to his failure to understand the English people and because of his religious views. His persecution of the Covenanters led to a rebellion and the final invasion of William of Orange. James was soon obliged to leave England, settling in St. Germain, France. Louis XIV. soon after granted him government support. In 1689 he attempted to regain his dominion in England by invading Ireland, but was defeated in a decisive battle at Boyne in 1690, and returned to St. Germain, where he resided until his death.

JAMES III., king of Scotland, son of James II., born in 1452; slain June 18, 1488. He succeeded his father on the throne of Scotland under the regency of his mother, and at her death, in 1465, came into full possession of the throne. His reign of twenty-three years was influenced largely by favorites, disturbed by international dissatisfaction, and by the general war spirit of the nobles. James brought the contempt of the war-like nobles upon himself by taking delight in literary pursuits. He was thrown from a horse and murdered while leading the royal army against a rebellion incited by the nobles, who were endeavoring to depose him.

JAMES IV., king of Scotland, son of James III., born March 17, 1472; slain Sept. 9, 1513. He succeeded to the throne of Scotland after the death of his father. Writers generally agree that he possessed marked personal charms. He secured popularity by the enforcement of the laws, encouragement of agriculture, and the dissemination of educational arts. In 1513 he invaded England with a Scottish army, but was slain in battle at Flodden on Sept. 9. He was succeeded by his son, James V. (1512-1542). The latter was the father of Mary Queen of Scots.

JAMES, Edmund Janes, political economist and educator, born in Jacksonville, Illinois, May 21, 1855. He studied successively at the Northwestern University, Harvard University, and the German universities of Halle, Leipsic, and Berlin. Later he served as principal of the high school at Evanston, of the Illinois State Normal School at Normal, and in 1883 became a teacher of economics at the University of Pennsylvania. He visited Europe in 1892 under a commission issued by the American Bankers' Association for the purpose of studying business methods, and four years later became professor of finance in the Chicago University. Among his principal writings are "Education of Business Men;" "Legal Tender Decisions," and "Chair of Pedagogy in Our Universities."

JAMES, Henry, novelist and essayist, born in New York City, April 15, 1843. His father was the celebrated author and lec-

turer on religion, Henry James (1811-1882). The James family went to Europe in 1854, and resided six years in France, Switzerland, and England, which gave the subject of this sketch many educational advantages. On returning to the United States he studied law at Cambridge, but owing to delicate health discontinued study and returned to Europe, where he resided the greater portion of his time, making only occasional visits to the United States. His literary career began in 1870, when he contributed to the "Atlantic Monthly," and shortly after wrote two novels, "Watch and Ward" and "Roderick Hudson." His extensive travels made him essentially cosmopolitan, gave him a wide range of literary treasure, and enabled him to treat national characteristics from a neutral standpoint. Though his writings exhibit a want of vigor, they abound with a wit and culture that recommends them to people of intellectual tastes. Among his best known writings are "French Poets and Novelists;" "Essays in London;" "The Americans;" "Siege of London;" "The Europeans;" "Trans-Atlantic Sketches," and "Lessons of the Master."

JAMESON (jā'mĭ-sŏn), **Leander Starr**, colonial administrator, born in Edinburgh, Scotland, in 1853. He was educated at the University College Hospital and the London University, graduating at the latter in 1875. After traveling in America, he settled at Kimberley, South Africa, in 1878, where he built up an extensive medical practice. He became associated with Cecil Rhodes in 1890, and soon after settled at Fort Salisbury, Mashonaland, as a representative of Cecil Rhodes and the South African Chartered Company. In 1895 he led the Jameson raid to Johannesburg, which resulted in his capture and imprisonment on conviction of a misdemeanor. The conduct of Jameson, together with the attitude of the British government, contributed largely to bringing about a crisis in South African affairs, which soon led to a war with the Boers.

JAMES STUART. See **Stuart.**

JAMESTOWN, an important city of Chautauqua county, New York, on the navigable outlet of Chautauqua Lake, about sixty-eight miles southwest of Buffalo. It has natural gas lights, electric street railways, the Holly waterworks system, and is a manufacturing and jobbing center. The manufactures include flour, pianos, cotton goods, ironware, furniture, bicycles, boots and shoes, and worsted goods. It is the seat of numerous schools, the Jamestown Collegiate Institute, and contains excellent libraries and a public park. The surrounding country is dairying and agricultural. Several important railroads furnish ample means of transportation for the various industrial products. Population, 1900, 22,892.

JAMESTOWN, the locality in James City county, Virginia, where, in 1607, the first English settlement was made in America. In 1676 Bacon burned the village built by the early settlers and it was never rebuilt. The old site has been destroyed largely by the fluctuations of the James River.

JANAUSCHEK (yä'now-shek), **Francesca Romana**, celebrated actress, born in Prague, Austria, July 20, 1830. She gave evidence of much artistic talent in early youth, was educated for the profession, and first appeared in tragic roles at Cologne. Subsequently she played successfully at Dresden, Frankfort, and other leading cities of Germany. In 1867 she visited the United States, where she attracted much attention, though her performances were exclusively in the German. On returning to Germany, she began the study of English, and visited the United Staes a second time in 1873, when she represented difficult roles of Shakespearean tragedy in English. She made an extended tour in Australia in 1884, visited the United States a third time in 1896, and extended her popularity by appearing in "Lady Macbeth;" "Medea," and "Marie Stuart." Later she appeared as the leading actress in "The Diamond Robbery."

JANESVILLE, a city in Wisconsin, county seat of Rock county, on the Rock River, about seventy miles southwest of Milwaukee. It is the focus of several railroads, giving it considerable trade advantages. Its public buildings include an excellent courthouse, high school, numerous churches, a state institution for the education of the blind, and several conservatories of music. The public library contains a large collection of well assorted books, while other facilities, such as electric lights, paved streets, waterworks, and electric street railways, add convenience and beauty to the city. The manufacturing institutions include iron foundries, machine shops, a cotton mill, woolen factories, and flouring mills. There are manufactures of vehicles, boots and shoes, and farming implements. The surrounding country is agricultural and noted for the breeding of high-grade horses and cattle. Population, 1900, 13,185.

JANIZARIES (jăn-ĭ-zā'rĭz), a corps of Turkish infantry organized by Sultan Orkhan in 1330. It was the first regular standing army organized by the Turks, was comprised largely of children captured from Christian parents and brought up as Mussulmans, and used principally for garrison duty. According to an edict, they were provided with no habitation but their quarters, were forbidden to marry, enjoyed numerous special privileges, and took the field only when the sultan was in command. The army of Janizaries numbered 10,000 in 1362, but later developed a strength of 100,000 men, while the irregular militia included 350,000. Their remarkable bravery and daring won Ottoman victories for more than two centuries, but later they degenerated into lawless and insubordinate bands, and planned several successful plot

to assassinate Turkish nobles and sultans. In the war of 1826 with Russia they revolted, which led Mahmoud II. to determine upon their destruction. Large numbers were banished by proclamation, others executed, while the last resisting forces made a desperate resistance. They lost 16,000 in killed and 7,000 were burned in barracks. In the organized military forces of Turkey they were succeeded by the nizam, the regular Turkish army, organized and disciplined on the general plan adopted by European powers.

JANUS (jā'nŭs), a Roman deity worshiped with utmost affection and veneration. He is regarded the most ancient king of Italy, a ruler of wisdom and moderation, on account of which he was deified and the first month of the year named in his honor. Being endowed with knowledge of all the past and the future, he was able to adopt the wisest measures for the welfare of his subjects, and, on this account, is represented in statuary with two faces—the one looking to the past and the other to the future. Instead of building temples to Janus, he was honored by all the gates of the cities being dedicated to him. The most massive gate thus dedicated was at the Forum of Rome, which was open only in the time of war. However, Roman wars were so numerous and extended that the gates of this sanctuary were closed only three times within 700 years. In ancient paintings he is represented as the doorkeeper of heaven, bearing a key in one hand and a rod and scepter in the other.

JAPAN (ja-păn'), an ancient and celebrated island empire of eastern Asia, called by the natives Nippon, meaning "Land of the Rising Sun." It is situated east of China, and enclosed by the Sea of Okhotsk, Japan Sea, Corea Straits, and the Pacific Ocean. The three principal islands are Nippon, Shikoku, and Kiushiu, besides which are a large number of smaller bodies, the most important being the Kurile group, Yezo, and, since the war of 1894 with China, Formosa. The entire archipelago consists of an immense number of islands, about 4,000, all of which appear to be the more elevated portions of a partially submerged mountain system. Its total area is 161,180 square miles; the population, 47,080,500. The inhabitants include only 11,500 foreigners, of which one-half are Chinese. Yokohama is the capital. Other important cities are Tokio, Sakai, Saikyo, Osaka, Nagoya, Kyoto, Kobe, and Sendai. There are eighty cities that have a population of over 20,000.

The physical features of the Japanese islands are variously marked by climatic influences, owing to their extent. It may be said the main group is crescent-shaped, with the convexity turned toward the Pacific Ocean, the several portions being separated by narrow channels in which numerous islets abound. The coasts are indented by numerous gulfs and bays, but possess few good harbors. In most of the islands the coasts rise abruptly from the sea in rocky precipices, which continue in the form of mountain chains and diversify the surface with marked elevations, alternated with beautiful and fertile valleys. The dormant volcanic mountain, Fusiyama, situated on Yezo, rises 12,365 feet above the sea-level, and is the culminating point of the island group, but Fusi, on Nippon, is almost equally elevated. Numerous active volcanoes exist, while earthquake action is frequent, the most damaging disturbances on record occurring in 1707, 1783, and 1792. In the earthquakes of 1792 fully 53,000 people were killed by the eruptions of Wauzendake, on Kiushiu.

The geological formations are largely igneous, while large deposits of coal, salt, sulphur, feldspar, sandstone, gold, silver, copper, lead, tin, and other valuable minerals abound. Sperm whales infest the waters, yielding an abundance of ambergris. Thermal springs and deposits of petroleum and gas are frequent. The climate of the southern islands is similar to that of southwestern Europe, though in the north the winters are extremely cold; snow sheets cover the plains and valleys from November to May. Owing to the typhoons that sweep across the Pacific, dense fogs and violent storms prevail along the southeastern shores, though they affect the entire group more or less. The climate is largely semi-tropical and semi-temperate, on account of which vegetation is luxuriant and includes a rich and varied flora. Vast forests of oak, pine, palm, banana, tree-ferns, and other varieties abound in the portions favorable to the different classes of timber. The mountain sides are clothed with large beech, chestnut, cypress, elder, elm, maple, and cedar trees. As a whole the soil and climate are alike favorable to the production of all useful varieties of cereals, fruits, and domestic animals. In the south rice, sugar cane, tea, coffee, cotton, fruits, and hemp are the principal agricultural productions, while those grown farther north include tobacco, wheat, oats, barley, corn, rye, and vegetables. In silk culture the Japanese have taken an advanced position for centuries.

Fully 20,000,000 of the people of Japan are engaged in agriculture. The annual rice production is 205,500,000 bushels, and constitutes the chief product. Among the manufactures are paper, matches, glass, japanned ware, porcelain, machinery, bronze ware, and woolen, cotton, and silk fabrics. The ceramic art was introduced into Japan as early as 27 B. C., though its greatest development dates from the early part of the 13th century. As a general rule the factories are comparatively small and employ an average of from forty to fifty men, though the aggregate capital invested is extensive. Until recently the large machinery used in the manufactures and in agriculture was imported from America and Europe, but the

rapid strides made in education and industrial arts have led to a utilization of native resources, the government encouraging the same by grants and efficient supervision. The mikado has not only encouraged appropriations for this purpose, but skilled laborers have been invited to Japan to teach and direct in utilizing its wealth of natural resources in the modern arts of manufacture.

Perhaps no people in history have made more marked changes than the Japanese in the last half-century, particularly in the use of machinery, modes of living, and educational arts. Since they have in large quantities all the essential substances for manufactures, such as timber, coal, iron, and stone, and possess the necessary intellectual and physical capacity, it is but natural that their cities should rise, factories develop, canals and railways extend, and all the institutions of civilization thrive. The domesticated animals include poultry, cattle, swine, horses, buffaloes, zebus, dogs, and cats. Large quantities of valuable fin fish and shellfish abound in the seas and streams, and more largely supply the people with flesh than the herds of domestic animals. Many varieties of beautiful birds of song and plumage abound. Snakes, rats, deer, lizards, and tortoises constitute the principal wild animals, and centipedes, scorpions, mosquitoes, and flies are among the more common insects.

The railroad systems of Japan are partly under the control of the government and partly owned by private companies. They extend from the principal cities of the coast to the interior agricultural and mining districts, and penetrate largely all the productive portions of the empire. At present the lines aggregate 6,950 miles. Canal communications have been constructed to connect the streams and to provide means for reaching a number of the interior lakes. Only within recent years have the Japanese grown into the habit of utilizing rapid transportation, but, unlike their Chinese neighbors, they have taken to the newer and better methods of travel and transportation with marked enthusiasm, their general patronage almost equaling that of the United States. In 1871 they adopted the American postal system almost as an entirety, and now issue money orders, maintain a parcel post, have free delivery in the larger centers of population, and maintain an efficient foreign service. The submarine cable, telegraph, and telephone systems are modeled after those of American pattern, while their railroad cars, though largely made in Japan, contain many iron and steel portions manufactured in Europe and America. Their financial system is based upon the gold standard, which was adopted in 1897, though silver and subsidiary coins are circulated extensively, and, for the purpose of providing an adequate volume, paper currency redeemable in coin is in general circulation. In the monetary system the yen is the unit of value, which is worth in United States currency about fifty-two cents, while silver coins are circulated that have a value of fifty, twenty, and ten cents; their five-cent coins are made of nickel, and two, one, and one-half cents of copper. The total annual revenue of the government is approximately 240,000,000 yen, which is about equal to the annual expenditures, and is made up largely by the collection of revenues accruing from telegraph, posts, excise, registration, income tax, customs, state service, and the telephone systems.

The public school system is under the superintendence of the general government; attendance is free, and compulsory at specified ages, and all grades of work with suitable courses of study from the kindergarten to the university are maintained. Common elementary schools are located in all the individual communities and culminate in a high school, while normal training schools are supported for teachers; industrial schools to disseminate knowledge in relation to the industries, and colleges and universities for the purpose of maintaining a proper standard for the learned professions. The imperial university, located at Tokio, is the culminating institution of higher learning. Its courses of study articulate with those of other higher institutions maintained in college centers. This noted central institution was reorganized in 1886, and maintains departments of science, literature, law, economics, medicine, engineering, and civics. Its faculty of instructors includes ten German professors, nine English, two American, and two French. About 2,800 students receive instruction at this center of learning, at which they have access to a large library and utilize the most modern apparatus. There is also an imperial university at Kyoto. Newspapers, magazines, and books are being produced extensively and read widely, while liberal translations have been made from the productions of other countries. The public library belonging to the government contains more than 200,000 volumes and numerous manuscripts. A strict newspaper censorship is maintained, while imprisonment for publishing matter derogatory to the government is not infrequent.

The Japanese speak various dialects of the same tongue, the only exception being the Ainos of Yezo, who number about 15,000. It is thought that the race is a mixture of the Malays of the islands situated toward the south and the Tartars who emigrated from Corea, and that their marrying and intermarrying finally resulted in the present marked Japanese type. The Aino race probably constituted the early population, which, after many centuries of wars, has become isolated to the Yezo wilds. Among the characteristics of the Japanese type are an oval head and face, well shaped and curved nose, slightly oblique eyes, and frontal bones

rounded. The expression inclines to the sordid, complexion rather pallid and yellowish, and the male face almost hairless, but quite often marked by a short and narrow mustache. The limbs are short in proportion to the trunk, though the stature is undersize. In complexion they are yellowish, but several shades darker than the Chinese, and the hair dark-brown or black and straight. The dress of both men and women has undergone marked changes within recent decades. The footwear consists of a small sock, called a tobi, which has a separate compartment for the great toe, is ankle high, and covered by a sandal of straw or a wooden clog, but these are removed when treading on matted floors. Though the footwear of men and women is the same, there are marked differences in the headgear and dress. In 1886 a national law was enacted requiring the government officials to wear European dress when on duty, and women of the higher classes began to appear in public with European garments. Since then dress reform has been advancing rapidly even in the lower classes, and the former garments, somewhat allied to the Chinese, have either become modified or are fast disappearing.

As a people the Japanese are cleanly, courteous, frugal, kind, and pathetic. The children are admonished to parental obedience, carefully disciplined, and all classes required by law to secure at least an elementary education. Tobacco-smoking is a common evil among both men and women, the theater a place of popular amusement, and flower and foliage favorite decorations for all public places and the home. The architecture, though ornamental, lacks solidity and proof against fire. While their builders are skilled as turners, joiners, and carvers of wood, they lack a knowledge of the more substantial and serviceable in architecture. Most of the furniture is plain and simple, kept unpainted, and the interior furnishings of edifices rather grotesque than beautiful. The presence of European and American engineering and architecture in the construction of railroads and electric car lines has led to revolutionary movements in the construction of public buildings, harbors, and aqueducts, and in shipbuilding. Modern forms of masonry and the use of steel are rapidly displacing the looser and less endurable Eastern style. The jinrikisha, a two-wheeled carrriage with two shafts drawn by a man, is still the common vehicle for conveyance, this having displaced the larger palanquin, though street railways, carriages, bicycles, and automobiles are coming into use in the larger cities and gradually gaining favor among the higher classes. Buffaloes and zebus are used as beasts of burden, while the horse and ox serve mostly for agriculture and draft purposes.

The religion of Japan is largely Shintoism, a form of worship according to whose tenets the mikado is held to have descended from the sun goddess, and constitutes their ancient non-idolatrous religion. Later Buddhism and Confucianism were brought over from China. The government of Japan sent representatives to England for the purpose of investigating the effects of Christian teaching, with a view of adopting that form of religion, but it was found that intemperance, crime, and lawlessness are less common in Japan than in England, and the official report resulted unfavorably to a change. Religious worship is free to all foreign residents, but the spread of foreign religions is looked upon with jealousy by the natives. There are 96,500 temples, many of them beautiful structures and quite similar in design. Those in the large cities are magnificent and costly buildings, the most celebrated being the temple of Asava at Yeddo. Worship is observed at the temples, where a profound spirit of reverence and piety is displayed, while ancestral worship also prevails. Respect for the gods and the living parents is the spring of all virtues.

The history of Japan dates from 660 B. C., though fully 1,000 years following this date are legendary; authentic history begins in 500 A. D. Jimmu Tenno is the reputed founder of the present dynasty, and, according to history, ascended the throne in 660 B. C. Empress Jingo invaded Corea in 201 A. D., from which time Corean civilization dates, and the Rongo and Senjimon, sacred Chinese books, were introduced in 285 by the Coreans. Buddhism gained a fooothold in 552, became the established religion in 595, and in 624 the government established a Buddhist hierarchy. Chinese civilization was assimilated largely through commercial relations, and after 646 great strides of advancement were made in government, science, and educational arts. The Fujiwara family established a superior form of civil service several centuries before 792, but by that time the military classes rose, and Yoritomo became shogun or generalissimo. This ruler is known generally to Europeans as Tycoon, the name applied by the Chinese. While he was not recognized as the person in whom the reigning power was vested, he really governed, but paid homage to the mikado, who was regarded as the spiritual emperor. At that time the spirit of militarism spread to all parts of the dominion; in many cases the Buddhist monasteries even became military centers, which continued until 1603, when Tokugawa Iyeyasu gave lasting peace by reason of superior statesmanship. He made Yeddo the capital and center of power, from which his lineal descendants governed until 1868. This dynasty, known as the Tokugawa, repelled the Portuguese invasion in 1638, prevented the spread of Christianity, built great cities, and maintained a commerce and interior development distinctly Japanese, excluding

A STREET IN TOKIO, JAPAN.

(Opp. 910.)

JINRIKISHA RIDE.

entirely all classes of foreigners. In 1853 Commodore Perry entered the harbor of Uraga with a United States squadron, and secured a treaty with the shogun, on March 31, 1854—a treaty which caused Japan to be opened to the commercial nations after its seclusion for 216 years. Since then modern civilization and arts have overwhelmed the Japanese like a contagion. The feudal system that rose under military fiefs was overcome largely. In 1867-68 the shogun was overthrown and replaced by a powerful empire under the mikado. Yeddo was renamed Tokio; a constitution granted, and modern arts applied to every vital branch of the government and industries.

The new constitution promulgated in 1889 is modeled after that of the German Empire, providing for a national judiciary, a legislative department of two branches, and carefully guarding the prerogatives of the throne. The two branches of the legislative department, known as the house of peers and the house of representatives, have each about 300 members. For administrative purposes the nation is divided into forty-three ken or provinces, and three fu or city governments, the latter being constituted of Tokio, Osaka, and Kyoto. The male succession is definitely fixed by the constitution. Provincial assemblies legislate for local needs, but they are limited in their powers by constitutional provisions. Military service is mandatory for three years, while all males between seventeen and forty belong to the national army. The total armed and reserve forces consist of 415,000 men, the former being 125,000 men and officers. The reserve, or landwehr, and the landsturm constitute the two main divisions of the military forces. The navy consists of sixty-seven large ships, twelve torpedo-boat destroyers, and a proportionately large number of cruisers and small vessels. The officials, commanders, and engineers of the Japanese army and navy are largely graduates of European military academies, and under their discipline and management the forces of that country have become the most efficient of Asia.

The effective strength of the Japanese military force was ably demonstrated in the Chinese-Japanese war in 1894-95. This war resulted from internal dissensions occurring in Corea in 1894, which arose from the Japanese and Chinese factions in that country. Each of these respectively appealed to Japan and China for aid to quell insurrections, and, as each complied, a formal war was declared in August. A Japanese army promptly invaded China, while its navy destroyed that of the Chinese within a period of three months. The loss of immense stores and 25,750 men prompted China to ask for peace early in February, 1895. The conditions of the treaty ratified a month later provided for a cash war indemnity of $150,000,000, the independence of Corea, and the cession of Formosa to Japan. Among the important events occurring since are those in relation to commercial treaties with other nations, the extension of vast internal improvements, and the prominent part taken in the Chinese war of 1900-01. In 1904 it became involved in an extended war with Russia, because the latter country had occupied Manchurian territory since 1900 and refused to evacuate. Hirobumi Ito, called the Bismarck of Japan, became prime minister in 1900. Mutsu Hito is the present mikado or emperor.

JAPANNING (jȧ-păn'ing), the art of coating articles of wood, leather, metal, and papier mâché with a variety of varnishes, which are caused to adhere by means of a high temperature applied in hot chambers during the drying process. The first step is to dry the article to be japanned, then apply several coats of varnish to constitute the priming, and afterward mix the ground tint with the varnish. Several designs are secured by painting with colors, after which additional coats of varnish are applied to insure permanence. The grades of varnish used are largely mastic and shellac, though copal, dissolved in alcohol, is used to add fineness and durability. As a general process japanning is immediately between painting and enameling, and is done largely in imitation of Japanese and Chinese lacquered work.

JARNAC (zhär'-näk), **Battle of**, a military engagement at the town of Jarnac, department of Charente, France, between 15,000 Huguenots under Louis, prince of Condé, and 26,000 Catholics under the duke of Anjou. Owing to the superior numbers of the latter, they gained a decisive victory.

JASMINE (jȧs'min), a group of flowering shrubs of the genus jasminum, including about one hundred varieties. They are native to Asia, but are found also in southern Europe and some species in Central Africa. In temperate climates they are cultivated in gardens for their evergreen foliage and very fragrant white flowers. Oil of jasmine is prepared from the flowers. Many of the species are twining plants. The leaves are simple or compound, the corolla tubular, the ovary two-lobed, and the fruit berry-like.

JASMINE.

JASON, in Greek mythology, the son of the king of Iolcos, in Thessaly, and celebrated because of his connection with the expedition of the Argonauts (q. v.). When his father, Æson, was compelled to flee from his dominion, young Jason was intrusted with the care of the Centaur, by whom he was instructed in all the useful and warlike arts. When maturing to manhood, he devel-

loped an uncontrollable desire to regain his paternal inheritance, and proceeded to demand possession of the kingdom usurped by Pelias from his father. Pelias commissioned Jason to secure the golden fleece suspended on an oak in the country known as Colchis, where it was guarded by a dragon that never slept, in return for which he was promised the kingly scepter. Accordingly he started out with a ship of fifty oars, manned with the bravest heroes of Greece, and sailed safely through many perils until he reached Colchis, where he was received with honors by Æetes. This king gave him a daughter in marriage, and promised to allow him to take the golden fleece on condition that he would yoke two fire-breathing bulls and sow the dragon's teeth in Thebes. To do this task Jason secured the aid of Medea, the famous sorceress, and complied with the conditions. The account further enumerates the adventures of Jason and his crew in a series of combats with Æetes, using the warriors that sprang from the dragon's teeth sown in the soil, and the perilous return to the island of Crete. Soon after he avenged the murder of his father by putting Pelias to death, but was compelled to flee to Corinth on account of insurrections. Later he married Glauce, the daughter of the Corinthian king, and divorced Medea. Indignant at the wrongs of her husband, Medea put to death her three sons, which so despaired Jason that he threw himself on his own sword and perished on the threshold of his deserted and desolate home.

JASPER, an opaque mineral belonging to the quartz family. It is very abundant and is prized for ornamental purposes, being susceptible to a high polish and is of almost any color. The different varieties of jasper include the Egyptian jasper, with distinct stripes; agate jasper, found in layers with chalcedony; and porcelain jasper, a kind of natural porcelain formed by the action of fire. Heliotrope or bloodstone is a variety of quartz having blood-red particles of jasper embodied in its mass.

JASPER, William, soldier, born in South Carolina about 1750; slain at Savannah, Georgia, Oct. 9, 1779. At the beginning of the Revolution he joined the second South Carolina regiment and held the rank of sergeant. He became distinguished at Fort Moultrie on June 28, 1776, when, during an attack by the British fleet, the colors were shot down and he braved a shower of cannon shot to seize and replant them upon the works. A lieutenant's commission was offered him by Governor Rutledge, which he refused. Afterward he again distinguished himself by commanding a roving squad upon the outposts. His death resulted from a mortal wound inflicted during the engagement at Savannah.

JASSY, or **Yassy** (yä'sē), an important city of Roumania, formerly the capital of the principality of Moldavia. It is situated near the Kopoberg Mountains in a beautiful valley of the Bachlui, a tributary of the Pruth, about 200 miles north of Bucharest. The city contains numerous edifices that date from the 14th century. Many of its streets are tortuous. It is connected by railroads and rapid communication lines, and is important as a commercial and manufacturing center. The business of the city is conducted mainly by Jews. Among its public facilities are several libraries, electric street railways, an art gallery, and numerous parks. Population, 91,500.

JAUNDICE (jän'dĭs), a morbid condition due to obstructed secretion of bile, usually rather an indication than a form of disease, though a malignant form is often followed by fatals results. Jaundice is marked by a yellowish color of the skin and eyes, peculiar languidness and weakness, and constipation. It results frequently from a diseased condition of the liver, or an obstruction of the bile-duct that connects with the intestines.

JAVA (jä'vạ), the principal island of the Dutch East Indies, and the most important colonial possession of Holland. It is separated from Sumatra by the Strait of Sunda; bounded on the north by the Java Sea, on the east by the Strait of Bali, and on the south by the Indian Ocean. Its length from east to west is 600 miles, breadth from thirty to 125 miles, and the area 50,554 square miles. The surface is rolling, being generally characterized by torrent-like streams and precipitous ravines, and by marshy tracts in the northern part. The southern coast line rises abruptly in unbroken cliffs, several of which extend as ridges over the island. They attain their culminating peaks in Slamat, height 11,325 feet; and Semiru, height 12,240 feet above sea-level. The climate is genial, moderated by sea breezes, and favorable to the production of cereals, fruits, forage crops, and domestic animals. Birds of fine plumage and song abound, while the tiger cat, snakes, wild hog, rhinoceros, panther, tiger, deer, several species of monkeys, and large bats are indigenous. The principal exports are tea, coffee, sugar, cinchona, tobacco, pepper, indigo, horses, buffaloes, and cattle. Manufactories have been established, producing textiles, toys, and earthenware; the supply of machinery, metal, petroleum, spirits, and clothing are imported largely. Vegetation is very luxuriant, the soil productive, and the colony exceedingly prosperous. Cable lines connect Java with Australia and Europe, and several railroads, electric car lines, and canals are operated. At present the railroad lines aggregate 1,650 miles. The total population is estimated at 26,500,000, of whom 54,500 are Europeans and 250,000 Chinese.

The ancient history of Java is clothed in legendry, the first authentic date being 412 A. D., when records were made of Hindu colonies. Under the Hindu dynasties the natives were converted to Brahmanism, but

this form of religion was succeeded by Mohammedanism in 1478. The island came under control of the Portuguese in 1511. In 1610 the Dutch made settlements, but they were suppressed by the English from 1811 to 1817, since which time the Dutch have governed the island as a colony without interruption. The natives belong largely to the Malay race and in religious affiliations to the Moslems, though there is a small per cent. of Christians, Brahmans, and Parsees. Several thousands of the natives are Christians. Dutch occupation has brought signal prosperity, developed the material resources, built an important commerce, and disseminated education and industrial arts through schools and several institutions of higher learning. Batavia is the capital. Soerabaya is the largest city. Besides these are numerous important seaports, among them Samarang, a thriving city. The standing army numbers 41,500 men and officers, of whom about half are Europeans. There is an extensive trade with Holland, Germany, and the United States.

JAY, a genus of birds of the crow family, smaller than the magpie and common crow. They are distinguished from the crow by

BLUE JAY.

having a shorter bill and wings, and a blue or brownish-red color instead of black. There are about twenty species, all having a tuft of feathers on the top of the head and a long rounded tail. They are found in North America and Eurasia, and live on insects, seeds, fruits, eggs, and young birds. The blue jay is one of the best known and handsomest species. It, like all others, has a peculiarly harsh, grating note, but when tamed partially imitates the human voice. The English jay is somewhat larger than the American blue jay, and the general color is a light brown, inclining to red.

JAY, John, statesman and jurist, born in New York City, Dec. 12, 1745; died May 17, 1829. He graduated from Columbia College in 1766, was admitted to the bar soon after, and became a member of the continental convention in 1774, at which time he wrote an address to the people of Great Britain. As a member of the second continental congress, he aided in making negotiations with France, and as a delegate to the New York convention assisted in preparing the state constitution. He became the chief justice of New York in 1777, was sent to Spain as minister in 1779 to secure a loan, and was instrumental in rendering valuable aid to the American cause. In 1783 he was associated with Franklin and Adams in negotiating the peace treaty with England at Paris. He was secretary of foreign affairs in 1784-89, aided

JOHN JAY.

Hamilton and Madison in writing the "Federalist," and was a leading advocate of the adoption of the constitution. When the New York convention assembled in 1788 to ratify the constitution, he took an efficient part in the deliberations, and the following year was appointed by President Washington as the first chief justice of the United States. In 1792 he failed in the election as a federalist candidate for governor of New York. The Jay treaty, negotiated with England, that country being represented by Lord Granville, in 1794, was unpopular in many sections of the country, and greatly weakened the federalist party. He served as governor of New York in 1795-1801. As a statesman, diplomat, and jurist he is ranked among the leaders of America, while his moral qualities and love of justice gave him high esteem, being reputed second only to Washington.

JEFFERIES, John Richard, naturalist and author, born in Wiltshire, England, Nov. 6, 1848; died Aug. 14, 1887. He first attracted attention as a journalist, in which capacity he wrote numerous articles on rural subjects. Like Thoreau, he possessed the happy faculty of minutely describing the humblest objects. Later he produced many valuable and charming works, among them "Game-Keepers at Home;" "Nature Near London;" "Field and Hedge-rows;" "Story of My Heart," and "Dewy Morn." Sir Walter Besant wrote his biography in a work entitled, "Eulogy of Richard Jefferies."

JEFFERSON, Joseph, comic actor, born in Philadelphia, Penn., Feb. 20, 1829. His ancestors were distinguished as actors, particularly his grandfather and great-grandfather, while his mother was a celebrated vocalist. He appeared on the stage in "Pizarro; or, Death of Rollo," at the early age of three years; when four, he performed complimentary equestrian acts, and in 1843 traveled through Texas and Mexico with a strolling company. In 1857 he appeared successfully in New York in several characters, played 150 nights at the London Adel-

phi Theater in 1865, and the next year repeated his triumph in New York. His most successful role was that of "Rip Van Winkle," founded upon the story by Washington Irving, in which he appeared as the principal attraction and conveyed scenes of delight and delicacy to his admirers. Later he was equally successful in "The Rivals" as Bob Acres. He published an autobiography in 1890, and in 1896 appeared at he head of a special company made up of the leading actors and actresses of the United States. His sister, Cornelia Jefferson Jackson (1835-99), was successful as an actress, playing in many of the leading cities of America. Joseph Jefferson, Jr., is also a noted American actor.

JEFFERSON, Thomas, third president of the United States, born in Shadwell, Virginia, April 13, 1743; died in Monticello, Virginia, July 4, 1826. His father, Peter Jefferson, was a planter, and died when Thomas was but fourteen years old. After attending private schools, he entered William and Mary College in 1760, and seven years later began the practice of law. He was chosen representative from his county to the Virginia house of burgesses in 1769, a position he held until the beginning of the Revolution. In 1772 he married Mrs. Martha Skelton, daughter of John Wales, an eminent Virginian jurist. The following year he was chosen a member of the first committee of correspondence established by the colonial legislature, became a member of the continental congress in 1775, and was one of a committee of five to prepare the Declaration of Independence, which, at the request of the committee, he drafted, and on July 4, 1776, it was adopted with only slight amendments. Soon after he resigned his seat in congress and became a member of the Virginia legislature. That body elected him governor of the state on June 1, 1779, to succeed Patrick Henry. Congress appointed him minister plenipotentiary in 1882 to act with others in negotiating a treaty of peace with Great Britain, and the following year he was elected a delegate to congress, in which capacity he secured the adoption of the dollar as the monetary unit and the present decimal system of coins. In 1784 he was appointed minister plenipotentiary to assist Benjamin Franklin and John Adams in negotiating commercial treaties in Europe, and the following year became minister at the French court to succeed Franklin, where he remained till September, 1789. On returning to America, he became secretary of state under President Washington, but resigned in 1793 and retired to private life at his home. His party brought him forward as a candidate for president in 1796, but Adams received the highest number of votes, and accordingly became president and Jefferson vice-president.

THOMAS JEFFERSON.

In the presidential election of 1800 the anti-federalist, or republican-democratic, party, as it began to be called, again selected Jefferson as its candidate, but as he received electoral votes exactly equal to those of Adams, the election went to the house of representatives, where he was elected president after a bitter struggle. In 1804 he was reëlected, and, after serving with eminent success, retired from public life, but continued an efficient adviser of his party. His administration was marked by efficiency, strict devotion to the common welfare, and the abolition of many usages of an aristocratic nature. Among the important events are the Tripolitan War, Louisiana Purchase, Lewis and Clarke expedition, the Chesapeake incident, the embargo act, and the organization of the democratic party. His state papers are able and clear, his practice was democratic, and his sympathy favorable to the limitation of slavery in the territories and the state of Virginia. The system of education adopted in Virginia was largely devised by him, and he also superintended the founding of the university of that state. It is certain that the practical teachings of Thomas Jefferson have had a wider influence upon the public life of Americans than those of any other man. His death and that of John Adams, both occurring on July 4, 1826, on the semi-centennial of the Declaration of Independence, is a peculiar incident of history.

JEFFERSON CITY, county seat of Cole county and capital of Missouri, situated on the Missouri River, about 123 miles west of St. Louis. Among its public buildings are the state capitol, the Lincoln Institute, the county courthouse, the state prison, a female seminary, and numerous churches and public schools. Its manufactures include brick, beverages, farming machinery, vehicles, and pottery. The surrounding country is agricultural and contains valuable deposits of limestone and bituminous coal. Among the general facilities are pavements, electric and gas lights, city waterworks, and street railways. The city also has a number of excellent libraries, and many well established civic and educational organizations. Population, 1900, 9,664.

JEFFERSONVILLE, a city in Indiana, county seat of Clark county, on the Ohio River, opposite Louisville, and on numerous important railroads. It is the seat of a fine public school system, the Southern State Prison, the United States quartermaster's supply depot, and numerous churches. The city has electric and gas lights, city water-

works, pavements, and is the seat of numerous factories. Among the manufactories are machine shops, foundries, shipyards, railroad car works, shot factories, oil refineries, and flour and lumber mills. There is a considerable trade in manufactures, coal, and produce. Population, 1900, 10,774.

JEFFREYS (jĕf′rĕz), **George, Lord,** lord-chancellor of England, born in Acton, Wales, in 1648; died April 19, 1689. He entered Westminster school as a student at sixteen, was admitted to the bar, and in 1683 became chief justice of the king's bench. His judicial life is marked with infamy and cruelty. To secure the special favor of James II. he decreed in a way to please the king without respecting justice or legal limitations. Among those suffering by his injustice are Algernon Sydney, Titus Oates, Richard Baxter, and the victims of Monmouth's unsuccessful rebellion, the latter resulting in the execution of 320 men, the transportation of 841, and the cruel and unusual punishment of many others. His boast that he had hanged more traitors than all his predecessors induced James II. to make him lord-chancellor. After James was forced to abdicate, Jeffreys was cast into the Tower, where he died four months later.

JEHOSHAPHAT (je-hŏsh′a-phăt), meaning "Jehovah's judgment," the son of Asa and the fourth king of Judah. The year of his birth is generally fixed at 950, and his rule between the years 915 and 890 B. C. He abolished idol worship and instead established the worship of Jehovah. Jehoram, his son, who was afterwards killed by Jehu in the battle of Ramoth-Gilead, reigned jointly with Jehoshaphat during his later years.

JEHOVAH (je-hō′vä), the most sacred of the names applied to the Supreme Being in the Old Testament, and used also to designate specially the God of the Jewish people. Its meaning is explained in Exodus to be, "I am that I am," thus predicating self-existence in a sense that it cannot be applied to any other being. To the Jews the meaning implied is the personality of the Creator and Ruler of the universe, their Theocratic Guide, the First and the Last, and above all gods. The name is of Phœnician origin and was used in a limited sense among the Israelites up to the time of Samuel, when its use spread rapidly. As a name it was deemed so holy by the Jews that they were guarded in allowing it to escape their lips, and therefore took means intentionally to mispronounce it or apply less sacred names, such as Adonai, which signifies lord, and Elohim. The latter is a less sacred name employed in some portions of the Pentateuch. Some writers think the name arose from Iao, the Phœnician sun-god in the several seasons, and especially in autumn, while others think it originated from Iao, the Chaldæan intelligent light.

JEHU (jē′hū), the eleventh king and founder of the fifth dynasty of Israel. He was commander of the Israelite army under Jehoram, stationed at Ramoth-Gilead. Here Elisha, the prophet, anointed him as king of Israel and announced that the dynasty of Ahab should come to an end. Jehu immediately attacked Jehoram, whom he slew with his own hand. Subsequently he beheaded seventy of Ahab's children and forty-two of the brothers of Ahaziah, king of Judah, and caused the queen, Jezebel, to be thrown from the palace walls and killed. King Ahaziah and all heathen priests were executed by the adherents of Jehu, and Jehovah's worship was reëstablished. He was noted for rapid driving and a violent, reckless character.

JELLY-FISH, a bell-shaped fish, belonging to the radiated animals, so called because, when lying on the sea-sand, it looks like a mass of jelly. It is familiarly known as sea-blubber and sea-nettle, two names originating from its long, stinging tentacles. In the water it appears exceedingly beautiful, moving with much rapidity by alternately contracting and expanding its crystalline-like body. Many of the jelly-fishes show a phosphorescent light at night. They live on crustaceans and small fish, which they seize with their tentacles. There are several orders and many species. They are devoured in immense numbers by the right whales.

JENA, (jĕn′a), a city in the grand duchy of Saxe-Weimar, Germany, about twelve miles southeast of Weimar. It is famous on account of the celebrated Jenà University, founded by John Frederick of Saxony in 1547, and opened for instruction in 1558. The founder intended to build a great seat of learning at Wittenberg that would lead in disseminating evangelical doctrine. Soon after imperial sanction was obtained it rose to eminence, and now attracts, as it has for several centuries, students from all parts of the world. Its faculty includes ninety professors. The courses of study are of an advanced character. There is an attendance of 600 students. Its alumni include the names of many scholars and men of literary fame. The university is supported by public taxes from all the Saxon states, has a splendid museum, zoological gardens, fine works of art, and a library containing 250,000 volumes. The city is beautified by numerous statues and parks. Population, 12,500.

JENA, Battles of, two important engagements between the Prussians and French, which occurred on Oct. 14, 1806, one near Auerstadt, Germany and the other near Jena. In the former battle Davoust commanded 30,000 French, and the duke of Brunswick 48,000 Prussians; while in the latter Napoleon I. commanded 90,000 French, and the prince of Hohenlohe 70,000 Germans. The French were victorious in both battles, thereby securing advantage over the whole of Prussia.

JENNER (jĕn'ẹr), **Edward**, eminent physician, born in Berkeley, England, May 17, 1749; died Feb. 26, 1823. His first training was secured under an apprenticeship near Bristol; later he studied at London under John Hunter, and subsequently practiced medicine in Gloucestershire. The belief prevalent among peasants that small-pox could be prevented by using cow-pox led him to study and apply the same in several cases, his success resulting in the introduction of vaccination in 1796. On May 14, 1796, James Phipps was vaccinated successfully, and was the first subject on whom the experiment proved efficient against the small-pox contagion. Soon after various physicians of Europe made similar experiments with more or less success, by which vaccination came into general use. However, the utility of vaccination as a preventative of small-pox has been questioned by many eminent practitioners. Jenner was remembered by being elected as honorary member of many learned societies. Parliament voted him grants amounting to $150,000 and a statue was erected in his honor in 1858.

JEPHTHAH (jĕf'tha), a Hebrew judge, son of Gilead, distinguished as a military leader. He defeated the Ammonites in a long campaign, and for his valor was chosen ruler of Israel, being the ninth judge. Previously he had made a vow that if God would give him victory over the Ammonites, he would offer as a sacrifice to Him, in a burnt-offering, the first thing that came to meet him out of his house. His only child, a daughter, met him, whom he sacrificed. Some commentators maintain that she was simply set apart as a virgin in the tabernacle. Jephthah ruled six years. A Latin drama, a poem by Tennyson, and Handel's last oratorio were suggested by the story of the sacrifice of Jephthah's daughter.

JEREMIAH (jĕr-e-mī'ah), the second great prophet of the Hebrews, so named to distinguish him from seven others mentioned in the Old Testament. He was the son of Hilkiah, one of the priests of Anathoth, and filled the prophetic office for thirty-seven years, covering the reigns of Kings Josiah, Jehoahaz, Jehoiakim, Jeconiah, and Zedekiah. In the thirteenth year of Josiah's reign, about 629 B. C., he was anointed, and at that time called himself a child. He lived through a very dark period of the history of Judah. Two powerful kingdoms were on either side—Egypt and Babylon. Josiah formed an alliance with Babylon and lost his life in fighting the Egyptians. Within the reign of Jehoiakim he prophesied of the destruction of Jerusalem and Judah, and later foretold that Nebuchadnezzar was appointed by God to bring upon Judah a time of desolation to last for seventy years. Zedekiah concluded an alliance with Egypt, but was defeated by Nebuchadnezzar. Jeremiah was treated kindly by the conqueror and offered the choice of a position in Babylon or to remain with his chosen people. He elected to stay, but was later taken to Egypt, where, tradition says, he was put to death for talking against idolatry. He wrote two books of the Old Testament—"Jeremiah" and "Lamentations."

JEREZ DE LA FRONTERA (hā-rĕth'-dā lä frōn-tā'rä), a city of Spain, in the province of Cadiz, sixteen miles northeast of the city of Cadiz. It is situated on the Gaudalete River, has railroad facilities, and is surrounded by a fertile country, which produces large quantities of fruits, especially grapes. There is a considerable trade in sherry wine, cereals, and fruits. The city has railroad facilities, many fine schools and churches, and several well improved streets. Population, 64,280.

JERICHO (jĕr'i-kō), a famous city of ancient Palestine, on a plain eighteen miles northeast of Jerusalem and six miles west of the Jordan River, near where that stream discharges into the Dead Sea. In the time of Solomon it was a flourishing city, exporting spices and balsam. Joshua made it his headquarters after his first entry into Canaan. It was destroyed by the Israelites and rebuilt by Hiel, the Bethelite, in 918 B. C. Later it was the seat of a school of prophets and the home of Herod the Great. Mark Antony assigned a portion of it to Cleopatra, queen of Egypt. Subsequently it was destroyed in Vespasian's reign and rebuilt under Hadrian. It was repeatedly captured by the Crusaders and finally completely destroyed. The village of Riha, with less than 200 inhabitants, now occupies the site.

JEROBOAM I. (jĕr-o-bō'am), son of Nebat, king of Israel, and founder of the kingdom constituted of the ten tribes of Judah that revolted against Rehoboam, only Judah and Benjamin remaining loyal to the latter. During his reign of twenty-two years he battled successfully against Judah, prevented a reunion of the Jews, and established idols and idol worship.

JEROBOAM II., the most prosperous king of Israel, who reigned from 823 to 782 B. C. After repelling an invasion of the Syrians, he took their cities of Hamath and Damascus, reconquered Ammon and Moab, and greatly strengthened and solidified his kingdom. His reign was marked by licentiousness, cruelty, and Baal worship. He is mentioned in the prophecies of Amos and Hosea, and in 2 Kings and 1 Chronicles.

JEROME (jĕ'rōm), **Saint**, a celebrated father of the Latin Church, born at Stridon in Dalmatia, between 341 and 345; died in Bethlehem, Palestine, Sept. 30, 420. He descended from wealthy though Christian parents, was educated under the direction of his father, and studied at Rome. In 373 he located at Antioch, in Syria, but soon after passed four years in profound study in the desert of Chalcis. Later he studied

in Antioch, was instructed at Constantinople by Gregory of Nazianzus, and in 382 gained many adherents by expounding the Scriptures at Rome. In 386 he established church service at Bethlehem, and also founded four convents, three for nuns and one for monks. While presiding over the latter, he made a translation of the Old Testament, which became the foundation of the Vulgate, and also prepared many important treatises on religious themes and church history. Among the subjects regarding which he argued are those relating to the doctrines of Origen and Palagius. His feast is celebrated on Sept. 30.

JERSEY CITY, an important city of New Jersey, next in size to Newark, county seat of Hudson county. It is situated on the Hudson River, opposite New York, with which it is connected by several ferries. The city is the termini of several transoceanic steamship lines, and has connections by numerous railways. There are about seventy-five churches, a fine school system, a normal training school, and many educational and charitable institutions and societies. The streets are platted at right angles, well paved, lighted by gas and electricity, and connected with Hoboken and suburban districts by electric street railway lines. Among the numerous manufacturing establishments are potteries, planing mills, and engine and car works. There are also manufactures of jewelry, rubber goods, fireworks, copperware, castor and linseed oil, hydrants, oakum, tobacco, lead pencils, etc. The trade in crucibles, live-stock, grain, and fruit is especially extensive. A capital of $20,000,000 is invested in manufacturing establishments; the annual products aggregate $40,000,000; 14,000 persons are employed, and they receive annually $8,500,000 in wages. There are many fine parks, substantial business blocks, and a growing jobbing trade. The site on which Jersey City stands was formerly called Paulus Hook, but named City of Jersey in 1820, and chartered as Jersey City in 1838. In size it takes rank as the seventeenth city of the United States. Population, 1900, 206,433.

JERUSALEM (je-ru'sa-lĕm), an ancient and interesting city of Palestine, in the Turkish province of Syria, noted as the holy city of the Jews. It is situated fifteen miles west of the Dead Sea, thirty-two miles east of the Mediterranean, about 2,500 feet above sea-level, on the slopes of two hills. Near it are two ravines; to the south the valley of Hinnom, and to the east the valley of Jehoshaphat. The ancient city is mentioned as early as 1500 B. C., when the Jebusites were in possession. Joshua conquered a portion of the city, but they maintained control of at least the upper part until the time of David, who made it his capital and strengthened the portion known as Zion. In the time of Solomon it attained its greatest prosperity, but began to decline shortly after his death. Nebuchadnezzar took it from Zedekiah in 586 B. C. after a protracted siege, carried many of the Jews to Babylon in captivity, and left it largely desolate. Cyrus permitted the Jews to return from captivity, and in 515 they rebuilt the temple, but the walls were not replaced until 455, in the time of Ezra and Nehemiah. Shortly after it was possessed by the Persians and passed consecutively to the Macedonians, Syrians, Egyptians, and Romans. It was sacked at various times, its temples burned, and the city razed.

Hadrian ordered Jerusalem rebuilt in 131 A. D., though it remained in a poor condition until Rome became Christianized, when it prospered for a time under the protection of Constantine the Great and his successors. With the Mohammedan conquest in 636 it became a possession of Caliph Omar, an Arabian, and continued under Moslem rule until 1099, when the Crusaders planted the cross upon its domes and converted it into the seat of a Christian monarchy. A desperate war between European Christians and Moslems prevailed for eighty-seven years, in which much life was spent and many institutions were ruined, but finally the city was taken by Saladin in 1187, and never retaken by the different armies of Crusaders. Since 1244 it has been constantly under Moslem rule, being under the Turks since 1517, and still remains a part of the Ottoman Empire. The last seven centuries have been largely times of peace, Europeans being permitted to explore, settle, and build institutions within its confines.

The various parts of Jerusalem are of intense interest to the Jewish and Christian travelers as they explore the old portions of the city, visiting the various historic places, such as the site of Solomon's temple, the palace of Jewish kings, the localities frequented by Jesus Christ, and the place of the Holy Sepulcher. Many excavations have been made to study localities of interest, while the ruins and structures remaining intact have been scrutinized with a devoted reverence. Formerly three walls provided amply against invasions, though these are largely among the ruins. It is remarkable that far more of the old city remains than is left of either Carthage, Corinth, Tyre, or even Rome, yet many of the buildings are illy constructed, almost windowless, and marked by low and dingy ceilings. A majority of the buildings are one-story and present a unique appearance as they skirt the numerous tortuous streets. The manufactures are not important, including chiefly jewelry, clothing, fabrics, crucifixes, and utensils. In 1893 a railroad was opened to Joppa, while the railroad commerce, telegraphic connections, and other modern facilities have been enlarged and brought into extensive use.

Besides the beautiful Church of the Holy Sepulcher, there are numerous Christian

edifices, convents, and institutions of learning. Several mosques occupy conspicuous places, the most important being the Mosque of Omar, which occupies the site of Solomon's temple. Fifty years ago the inhabitants all lived within the city walls. At present nearly one-third reside in the suburbs. The Jews are immigrating rapidly and have fully seventy synagogues. They occupy the southwestern part of the city; whereas, the Christians reside chiefly in the western, and the Mohammedans in the eastern, including the Haram, or temple area. Christians and Jews are vieing with each other to secure the best sites. The different classes of people are Turks, Greeks, Armenians, Copts, Abyssinians, Syrians, Georgians, Jews, and others; the whole presenting a great mass of conglomerated humanity. There are several fine hospitals, seminaries, and elementary schools. An extensive society known as Zionists, well organized in Europe and America, constituted of wealthy and representative Jews, is vigorously promulgating a plan whereby the city is to be reoccupied and invigorated by the Jewish people. At present the population is 48,500, two-thirds of whom are Jews, about 9,000 Christians, and 5,500 Mohammedans. See **Zionists.**

JESUITS (jĕz′ū-ĭtz), or **Society of Jesus,** a celebrated religious order of the Roman Catholic Church, founded in the 16th century under the leadership of Ignatius Loyola, and given papal sanction in 1540, with the first generalship vested in the founder. The original design of the originator and his five associates was to make a pilgrimage to Palestine and convert infidels, but, as this was averted by a Turkish war, the organization turned its efforts to meet the new conditions that had arisen after the Reformation. The vows include those of chastity, poverty, implicit obedience to superior authority, and to comply with the mandates of the pope in going to any country or under any conditions to convert heretics and infidels. Popes Paul III. and Julius III. recognized the influence that the Jesuits might wield and granted them extraordinary privileges, among them the power to absolve from all sins and ecclesiastical penalties; to exercise all priestly functions; to dispense themselves from the prohibitions of meat and observance of fasts, and added extraordinary privileges in the use of the breviary. Their efforts were marked by much activity against the rise of Protestantism, while in their practices they carefully avoided the appearance of pride, seclusion, and superiority, rather mingling promiscuously with the common people and adapting themselves to various local circumstances.

Besides opposing Protestantism, the Jesuits labored against the claims of monarchs to counteract the establishment of papal power. Their influence spread rapidly, more or less affecting all European countries, even the new settlements of America, though the work was less effective in the United States than in Canada, Mexico, or the countries of South America. Their remarkable rise of power at European courts and among the people led many institutions of learning, professors, and the non-Jesuit clergy to fear them. It was largely for this reason that the parliament of France resisted the Jesuits in their attempts to obtain a foothold, though by the assistance of the Guises they succeeded in getting legal recognition in 1652, but were required to renounce some principles and assume the name of Father of the College of Clermont. Their power in Germany gave them marked influence after 1549, when they secured chairs in a number of universities and exercised political influence, but lost some power by the Jansenist controversy. Soon after the famous "Provincial Letters" from the pen of Pascal weakened their influence by pointing out doctrines and practices dangerous and vacillating, and called attention to their consecration to the policy that "the end justifies the means."

In 1773 Pope Clement XIV. suppressed the whole Jesuit order by a papal bull, but in 1814 it was restored by Pope Pius VII. During the suspension of the society the excellent institutions founded by the Jesuits in Canada were either confiscated by the government or destroyed, but since then they have been replaced and greatly enlarged. Among the excellent institutions in Canada are the St. Mary's Academy in Montreal, which is unrivaled by any other Canadian institution; the church in Montreal, and the St. Boniface in Manitoba. In the United States they possess a great many excellent institutions, the most noteworthy being the Santa Clara, near San Francisco; St. John's College, New York City, and a central institute for young Jesuits at Woodstock, Maryland. The Jesuits have not had legal existence in Italy since 1861, and were expelled from Germany in 1872, these two countries being hostile to the order on account of their opposition to the present governmental organizations, which they opposed during the formative period. France expelled them from their conventual establishments in 1880, which caused many Jesuits to settle in Britain. Within recent times they have taken unusual interest in ecumenical councils, labored earnestly among the American Indians, and exercised influence in shaping the higher policy of the pope and the church.

JESUS CHRIST, the Greek form of the Hebrew word Joshua, contracted from Jehoshua, meaning Jehovah or Saviour. It is the name applied to the son born of the Virgin Mary, who had conceived of the Holy Ghost, the third person of the Divine Trinity. He was born in Bethlehem, Palestine, in the year 4 B.C., the Christian era being designed to date from the birth of Christ, though an

error in reckoning the date makes it quite certain that Jesus was born four years prior to the chronology accepted by the Christian nations. His mother, the Virgin Mary, was of the tribe of Judah, betrothed to Joseph, a carpenter by occupation, and their genealogies are given in Luke and Matthew respectively. Our information regarding the life and ministry of the founder of the Christian religion is derived almost exclusively from accounts written by the four evangelists—Matthew, Mark, Luke, and John—and references found in other portions of the New Testament. Joseph and Mary resided at Nazareth, proceeded to Bethlehem to be taxed, and while there Jesus was born in a manger, the inns being entirely occupied. He was circumcised on the eighth day in accordance with the law of Moses.

JESUS CHRIST.

Angels announced the coming of Christ to shepherds tending their flocks on the night of his birth. Soon after wise men of the East, or Magi, came to adore and present royal gifts to the young child, proceeding to Bethlehem under the guidance of a star. The alarm felt by Herod led him to issue an edict requiring the destruction of the male children at Bethlehem less than two years old, which caused Joseph and Mary to flee with the child to Egypt for safety, and, after the death of Herod, they took up their residence in Nazareth in Galilee, from which circumstance Jesus is often alluded to as the Nazarene. Little is known of the boyhood of Christ. The first definite incident is that in relation to his presence at Jerusalem when twelve years of age, where he was taken by his parents. It is related that he was lost from Joseph and Mary for three days, and when found was in consultation with the doctors, hearing instruction and asking questions. During the next eighteen years he probably labored as a carpenter, though the evangelists are silent regarding his life at this time. His public teaching began when about thirty years of age, about which time he was baptized by John in the Jordan River and recognized as the Messiah.

The succeeding events in the life of Christ occupy the important period of ministry, his death occurring in 29 A. D., or when he was about thirty-three years old. After spending forty days in the wilderness in fasting, meditation, and prayer, he selected his disciples, began to teach the people, and enforced his injunctions by numerous scriptural evidences and miracles, all of which are clearly described in the New Testament. After a trial before Pilate on a pretended charge of blasphemy, he was condemned to be crucified on Golgotha, or Mount Calvary. Joseph of Arimathea took the body from the cross and placed it in a tomb, where it was guarded by Roman soldiers, but on the third day Christ arose from the dead. After appearing to his disciples and others, and spending forty days on earth, he gathered many of his followers on the Mount of Olives and ascended visibly into heaven. The life of Christ displays a remarkable character, his teachings constitute the noblest and purest system of morality, and the religion founded by him is embraced by the most enlightened people. See **Education.**

JET, a black and compact variety of lignite. It is light, hard, and capable of being turned easily, or cut into articles for charms and ornaments; it takes a fine polish. Jet is found in Eurasia, particularly in Asia Minor, France, and at Whitby, in Britain. The jewelry and various articles of ornament used for mourning are made largely of jet, though excellent imitations are produced from tempered india-rubber and glass; those produced of the former are known as ebonite or vulcanite.

JETTY, a construction of masonry or wood projecting into the sea and serving as a wharf or pier for landing and shipping, or as a mole to protect a harbor. Jetties are also constructed in rivers for the purpose of increasing the current and depth by narrowing the channel. Among the most noteworthy in the United States are those at the mouth of the Mississippi, which have caused the river depth to be increased from seven to thirty feet. These were planned and constructed by Capt. James B. Eads (q. v.), largely at his own expense. The value of his work became recognized shortly after, and, on account of their utility, congress appropriated $4,250,000 to reward him for his time and labor. There are also numerous important jetties in many harbors of the great lakes, which serve to deepen and render safer the landing. Among the many jetties of Europe those in the Danube are of greatest utility, since they have increased the depth of the main channel of its mouth twenty feet and made navigation by the largest steamships possible. In numerous places jetties are also serviceable in retarding the advance of sand and gravel bars.

JEVONS (jĕv'ŏnz), **William Stanley,** political economist, born in Liverpool, England, Sept. 1, 1835; died Aug. 13, 1882. He studied at University College, London, and at the London University, and shortly after settled for five years at Sydney, Australia, where he was employed in the mint. In 1866 he was appointed professor of mental philosophy, logic, and political economy at Owens College, Manchester, and in 1876 secured a similar appointment at University College, London. Among his best known

productions are "Serious Fall in the Production of Gold;" "Elementary Lessons in Logic;" "Theory of Political Economy," and "Investigations in Currency and Finance."

JEWELRY (jū'ĕl-rў), the precious stones, gems, or ornaments prepared by jewelers, also the art of mounting precious stones. Jewelry made of metals, amber, alloys, coral and other materials were used as personal adornments from the earliest periods of history, and were commonly worn by peoples in all stages of savagery and civilization. Relics found in the tombs of ancient Egypt, Peru, and Mexico indicate that jewelry was highly prized. The relics obtained in Egypt indicate that gold work of the highest quality was used extensively for ornaments about 3,000 years ago. In many of the European museums are splendid specimens of ancient Roman and Greek jewelry produced by Etruscan artists, these being secured from the tombs of Etruria. Most jewelers of Oriental countries still pursue the primitive methods of manufacture common many centuries ago, and by their dexterity and refined taste secure results quite excellent, though their products are surpassed by workmen using modern methods. The jewelry trade of modern times is an important branch of industry. In America its greatest center is in New York, while Paris, Berlin, Vienna, and London are important European centers of jewelry manufacture and trade.

JEWS, a race of Semitic people who descended from Abraham. They possess an early history closely linked with that of Palestine, and are also known as Hebrews and Israelites. Their history dates from the time when the patriarch Abraham left Ur of the Chaldees and settled in Canaan or Palestine. He and his descendants, the houses of Isaac and Jacob, flourished in the southeastern part of Palestine until Joseph, a son of Jacob, became a high official of Egypt. At the time of a widespread famine Jacob and his other eleven sons were induced to emigrate to Goshen, Egypt, where their descendants flourished with marked prosperity for 430 years, though during the latter part of the period they were treated as bondsmen and held in abject slavery. It is thought Rameses II. was the Pharaoh who first oppressed the Israelites, and that their deliverance was effected in the reign of his son. In 1320 B. C., or according to others in 1491, Moses became their deliverer and led them out of bondage, directing their famous exodus and wandering in the wilderness in the vicinity of Kadesh, near the boundary of Palestine. During this period they numbered several million. They were divided into twelve tribes according to their descent from the twelve sons of Jacob, receiving in the wilderness through Moses, direct from God, the ten commandments on Mount Sinai, and a complete polity of government. The government was theocratic; the hereditary priesthood vested in the tribe of Levi, originally under the direction of Aaron, the elder brother of Moses, and constituted the central idea of national unity.

At the close of the extended wanderings in the wilderness they marched northward to found settlements in Palestine, but Moses died before setting foot upon the land of promise and was succeeded by Joshua, who led the hosts of Israel and successfully conquered the regions west of the Jordan from the Canaanites in 1274 B. C. However, the native peoples were not entirely subjugated at that time, though the lands were divided among the twelve tribes, each receiving a district more or less separated from those of the others, and the whole was governed as a union of states under local chiefs. The grazing lands lying east of the Jordan were allotted to the tribes of Gad, Reuben, and the semi-tribe of Manasseh, and the others —Benjamin, Simeon, Dan, Judah, Ephraim, Zebulon, Asher, Naphtali, and the second semi-tribe of Manasseh—received lands west of the Jordan. The priestly tribe of Levi secured forty-eight cities, the tenth part of all agricultural products, and was permitted in any portion of the territory.

Joshua died about 1220 B. C., after which period the bonds of unity between the tribes were less rigid, of which fact the Philistines, a people inhabiting the coast plains along the Mediterranean, took advantage and brought a portion of the Israelites under subjection. These wars were followed by the heroic age of the Jewish people, during which time they were governed by a succession of fifteen judges, of whom the most noted were Deborah, Gideon, Jephthah, Samson, and Samuel. Samuel was the most successful ruler since Moses, the last of the judges, and after popular entreaty by the people, inspired Saul, a Benjamite, to become king, he anointing him as ruler of all the Jews. Though a successful warrior, Saul lacked statesmanship, but succeeded in numerous battles against the Philistines until his final defeat and death at Mount Gilboa. He was succeeded by David, his son-in-law, who ruled in 1055-15. The successful reign of David caused him to become known as the greatest king of the Jewish throne. The period including the reigns of David and Solomon is designated the golden age of Jewish history.

David rose from the tribe of Judah. He was a native of Bethlehem, came in conflict with Saul until the death of the latter, and established a separate principality with Hebron as its capital. After a war of seven years, all the tribes acknowledged David king, who now transferred the seat of government to Jebus, a fortress conquered from the Canaanites, which he named the City of David, and later Jerusalem. During the long reign of forty years he conquered the Edomites, Moabites, Ammonites, Philistines, and extended his dominion from Damascus

to the northeast of the Red Sea. Solomon reigned in 1015-977. He built the great temple in Jerusalem, negotiated treaties with Tyre and Egypt, and extended commerce from Africa to Java and Sumatra. This sovereign also effected internal improvements, and showed a wisdom that became proverbial, but in the latter years of his life he was weakened greatly in influence by various causes which led to interior dissensions and insurrections. In 975 the Jewish people became divided into two nations; the kingdom of Israel under Jeroboam, and the kingdom of Judah under Rehoboam. The latter kingdom consisted of the tribes of Benjamin and Judah, while Israel was constituted of the other ten tribes.

The capital of Israel was first established at Sichem, but later transferred to Samaria. Rehoboam made a number of unsuccessful attempts to reconquer Israel, but was prevented by an Egyptian invasion under Shishak, and some time after Judah averted annihilation by Israel through an alliance with the Syrians. After varied successes in wars covering many generations, Shalmaneser, king of Assyria, subdued Israel in about 720 B. C., and carried many of the leading citizens away into captivity. The succeeding Assyrian king, Sargon, completely destroyed the government of Israel and settled the principal inhabitants in Media and Assyria, while Assyrian colonists occupied the different regions, intermarried, and largely formed the historic Samaritans. Among the most noted kings that governed Israel during its prosperity are Jeroboam I., Jeroboam II., Ahab, Joram, and Pekah.

Judah was less powerful and prosperous than Israel. The kings of the house of David numbered twenty, the most successful being Jehoshaphat, Uzziah, Hezekiah, and Josiah. These kings were the most devoted to the laws of Moses and the worship of Jehovah. This kingdom was invaded by Egypt and Assyria and later became tributary to Babylon. In 588 Nebuchadnezzar captured Jerusalem and carried away its riches, making the leading citizens captives. When Cyrus captured the throne of Babylon in 538, he set the Jewish people free, after a captivity of about seventy years, restoring them to their former possessions, but made Judah a Persian province. About 42,000 Jews returned to the vicinity of Jerusalem in 538 and built the second temple in 516. In 458 Ezra, the priest, led a second return of exiles to Palestine in the reign of Artaxerxes, and Nehemiah was appointed Persian governor, under whose reign the walls of Jerusalem were rebuilt. In the period between the return of Nehemiah and the fall of the Persian Empire, the Jews were Persian subjects, but this formed an epoch during which they enjoyed their own religious and educational institutions.

When Alexander the Great led the hosts of Grecian warriors into Asia, he penetrated toward the east and conquered the Persian Empire. In 332 B. C. the Jews submitted to him under promise that they be permitted to exercise freely their religious rites. After the empire founded by Alexander became divided, Palestine was made a possession of the Ptolemies of Egypt. About 100,000 Jews were taken to Alexandria and Cyrene, and settled largely from Libya to Ethiopia. Under a system of equal rights with the Egyptians they prospered; aided in building the great schools and libraries of Alexandria, and translated the Old Testament, this translation being known as the Septuagint, or Greek version.

About 198 B. C. a Syrian and an Egyptian party rose among the Jews of Palestine. This resulted in civil strife and finally brought on an invasion by Antiochus IV., in 170, which led to great slaughter and an effort to compel the Jews to change their religion. About this time the Maccabees attained power, and, after struggling fourteen years, succeeded in driving the Syrians out and establishing the sanhedrim, a national council. The Jewish reign of this epoch is marked by the establishment of the Pharisees and Sadducees, two rival sects. A controversy between Hyrcanus II. and Aristobulus over the title to the throne caused local disturbances and led the Pharisees, in 63 B. C., to ask aid of Pompey, who made Palestine a Roman province. The Roman senate recognized Herod the Great as king of Judea, who exercised sovereign prerogative in setting aside Jewish manners. Within his reign, in 4 B. C., Christ was born at Bethlehem, and in 6 A. D. Samaria and Judea became a united Roman province, being governed by a procurator from Cæsarea. In 26 A. D. Pontius Pilate was made procurator, in whose reign Christ pursued his ministry and suffered death. Herod Agrippa was king in 41-44, persecuted the Christians, and caused the apostle James to suffer martyrdom. An insurrection occurred in 65, which resulted in the capture and destruction of Jerusalem five years later by Titus. Hadrian razed it to the ground about 135 A. D. and erected a gentile city in its place, called Ælia Capitolina. He forbade the Jews under penalty of death to enter it, and not until the time of Constantine was the name of Jerusalem revived.

After the destruction of Jerusalem by Titus, the Jewish people became scattered extensively to all countries, and have since lived either as aliens or citizens by adoption. In the time of Emperor Julian they made an unsuccessful attempt to build a new temple at Jerusalem. This movement resulted in a revival of the sanhedrim at Tiberias, and the establishment of two presidencies of the sanhedrim—one at Tiberias and the other at Bagdad. From them the Jewish people attained a foothold among the learned and professional institutions suitable for the culture and higher education of the rabbis.

Among the celebrated products of their scholars is the Talmud, completed in the year 500, which contains expositions of the Old Testament with additions and annotations. By reason of their superior business sagacity and continued application, the Jews became ruling spirits in the commerce of the world, established great banking centers, and rose to stations of business and political importance. They flourished alike in the countries of Christians and Moslems, though during the supremacy of the Moors in Spain their learning and prosperity were greatest. In the 11th century they were largely colonized on particular streets in the cities of Germany, Italy, and France as a class of inferior or dishonored people, and often suffered by political and social oppression. In the 15th century Spain and Portugal required them to be baptized, to which they either consented, were put to death, or banished from the peninsula.

At the beginning of the 19th century the different nations began to treat the Jews as other citizens. Shortly after the French Revolution they were placed on an equality in France; Russia followed in 1811, Denmark in 1814, Britain admitted them to parliament in 1858, and Norway sanctioned their immigration in 1860. Other countries modified their laws more or less in harmony with France and Germany, though disturbances have prevailed periodically; the most noted of recent times are those occurring in Russia in 1892 and those in France in connection with the Dreyfus affair in 1899. In the United States they have always had equal rights with other peoples. The tenacity with which the Jews of modern times retain their racial characteristics, and cleave to the religion of their fathers among alien nations and peoples is remarkable. Some of the greatest names in modern history are those of Jews, among them Rothschild, Disraeli, Mendelssohn, Spinoza, Heine, Meyerbeer, etc. The greatest number of Jewish people are in Russia, where they aggregate 5,850,000; Austria, 1,950,000; United States, 1,145,000; Germany, 615,000, and Roumania, 450,000. The total Jewish population of the world is estimated at 11,800,000.

The Jewish language is a branch of the Semitic family of languages. Perhaps, originally it was the language spoken by the Phœnicians, and was adopted from those people by Abraham and his family at the time that patriarch settled in Palestine. The religious and moral notions of all Hebrews caused many distinct characters to be impressed upon it, as also did the long residence in Egypt and the sojourn in the wilderness, thus making it a dialect distinct in many essentials. While the oldest sacred writings known to us are in the Hebrew, there are secular works and inscriptions coming to us from older sources. It is quite common to distinguish the language by two distinct periods, including the time up to the Babylonian exile, and from the exile to the present. In the former period comparatively few foreign words were mixed with the language, while in the latter time many Arabian and Aramaic elements became incorporated. No material progress was made in securing a grammatical treatment of the language until about the 6th century A. D., when several technical texts were published. In the written language are many accents and marks of punctuation, but it has no capital letters. There are twenty-two consonants; five letters have a separate final form, and the vowels are designated by marks above or below the letters.

The literature is of vast importance because of its wide influence on the Christian and Mohammedan nations. It surpasses the literature of all other ancient peoples on account of the vigorous style of its poetry and its religious characteristics, and at the same time is the most reliable source of the early history of the human race. The Bible (q. v.) is the greatest product of Jewish literature. No work of ancient or modern times has been read and studied with an equal interest and devotion, and its precepts have influenced human action more than any other works, either singly or collectively. The first period of Jewish literature extends to 143 B. C., and one of its greatest products is the "Midrash," a work making inquiry into the meaning of sacred writings. In the second period, extending from 143 B. C. to 135 A. D., the "Midrash" was divided into the "Halacha" and "Hagada," the former relating to common law, and the latter embracing the religious teachings. Josephus in this period wrote his "History of the Jewish Wars;" Philo compiled various philosophical works, and divers writers produced the different books of the New Testament and the "Apocrypha," a work now seldom published in the Bible commonly used by Protestants.

The third period is included between 135 and 475 A. D., in which time the schools of Palestine and Rome gave instruction from the "Halacha" and "Hagada." In this time the scholars versed in the "Mishna," the oral law, exercised a wide influence, and the "Talmud," a work containing the "Mishna," was written. From this time on the Jewish people became widely scattered in many lands, thus causing them to acquire the language of the lands of their adoption. Many writers of modern nations are of Jewish extraction, the products being in various languages, and including works in philosophy, law, science, poetry, music, medicine, mathematics, philology, and higher criticism.

JEYPORE (jī-pōōr'), an important city of India, about 845 miles northwest of Calcutta, capital of the Rajputana province. It was founded in 1728. There are good railroad connections, a palace, and numerous temples and mosques. The public school system

is supported by taxation and grants, besides which an observatory, university, college of art, and mint are supported by the government. There are numerous public parks, the most noted being the Ram Newas gardens. The city has extensive manufacturing establishments, is a banking center, and the seat of a large interior commercial trade. It has electric railways, waterworks, pavements, and sewerage. Population, 159,750.

JEZEBEL (jĕz'e-bĕl), queen of Israel and wife of Ahab. She is noted for the evil influence exercised by her in dishonoring Jehovah and introducing idol worship. Under her influence the Jews were persecuted until all but about 7,000 turned from the true God. She continued to exercise influence during the reign of her son Jehoram, but was killed by the command of Jehu, who caused her to be flung from the upper walls of the palace to the ground beneath, where she was mutilated by chariots and devoured by dogs.

JITOMIR (jĭt-ō-mēr'), capital of the government of Volhynia, Russia, situated on the Teterev River, about eighty miles west of Kiev. It is a commercial center and contains numerous manufactories. There are important railway facilities, several schools, and a number of government buildings. Population, 60,500.

JOAB (jō'ab), a celebrated Hebrew warrior, nephew of King David, who flourished in the days of Saul. David gave him command of the entire army, but he was soon after displaced by the appointment of Amasa on account of not being trustworthy. In revenge he killed Amasa under the guise of deception, joined in a rebellion with Adonijah, but later was captured by Solomon and slain at the temple, where he had sought safety in hiding.

JOAN OF ARC, Maid of Orleans, celebrated French heroine, born in the village of Domremy, now department of the Vosges, France, Jan. 6, 1412; executed May 30, 1431. She descended from humble parents, secured a very rudimentary education, and learned to spin, sew, and do household duties. The protracted wars between France and England gave her much concern, and the woes of her country inspired her with an ardent desire to render patriotic service. When thirteen years of age, she was impressed with a belief that she was divinely chosen to assist the French dauphin. After solitary meditation, she proceeded to interview the prince, and with pious enthusiasm persuaded those in authority to give credence to the heavenly vision and angelic voices that had led her to activity. After donning male attire and equipping herself with a sword and a sacred banner, she proceeded with Dunois to bring about the deliverance of Orleans. An army of 10,000 men was placed at her disposal, with which she marched from Blois and entered Orleans on April 29, 1429. Her superb leadership and numerous sallies animated and inspired the French with confidence, and after successive and well directed attacks, forced Suffolk to abandon the siege of Orleans on May 8, 1429. Joan at once became a heroine of the French and the dread of the English. Numerous successes followed at Orleans, and shortly afterward she conducted Charles to Rheims, where he was anointed and crowned king, on July 17, Joan occupying a position of honor at his side.

JOAN OF ARC.

It was the wish of Joan of Arc that she might return home after this coronation, but, after prolonged persuasions by Charles, she was induced to remain with the army. In the attack on Paris, where the troops were repulsed by Bedford, she received a slight wound, but continued aggressive action until May 25, 1430, when she was taken a prisoner by the Burgundian forces in Compiegne, and sold to the English for $3,200. The latter took her to Rouen, subjected her to a prolonged and shameful trial, and condemned her to death as a sorceress. Shortly afterward the punishment was commuted to perpetual imprisonment, but the English found a pretext to treat her as a relapsed criminal and condemned her to be burned. This terrible fate she suffered May 30, 1431, and her ashes were thrown into the Seine River. A court was constituted by Pope Calixtus III. in 1455, which declared her innocent and pronounced her trial unjust. In French history she occupies a place of honor, and in the history of civilization ranks as a heroine and martyr, her memory being fittingly commemorated in statuary and literature.

JOASH (jō'ăsh), son of Jehoahaz, king of Israel, who reigned from 838 to 823 B. C. Like his father, he followed Baal worship. As a warrior he is noted for courage and activity.

JOB, meaning the hated or afflicted, the hero of the Book of Job, which forms a part of the Old Testament. Whether Job was a real personage or the hero of a poem or drama in a similar sense as Shylock in Shakespeare was real, is a question which scholars are unable to decide, and upon which there is a diversity of opinion. Where the Book of Job was written and who wrote it is not known. Some think it antedates the Books of Moses, while others believe Moses himself to be the author, and still others accredit it to Solomon. Whatever its origin, the book or poem seems to be from an enlarged Hebrew thinker, vindicating the

divine government of the world. As a gem of literature it ranks with "Faust" and "Hamlet." The Book of Job is a production intended to widen the conception of the providence of God. It sets before men a new view of suffering and trial, in which it was possible for a man like Job to remain true to his trust, and look beyond to another life where God will vindicate such trust. It is represented that Job lived in a region between Palestine and the Euphrates known as the land of Uz, and his life presents a remarkable steadfastness in fidelity to Jehovah through suffering and affliction.

JOEL, one of the twelve minor prophets, who delivered his predictions in or about the time of Joash, and after the exile dwelt in the vicinity of Jerusalem. Though little is known of him personally, his prophecies are highly esteemed among those of other prophets. The occasions on which he prophesied were natural plagues, such as extreme drought and the scourge of locusts. These were pointed out to be judgments sent upon Israel on account of waywardness, and they were implored to repentance for fear the nation would meet complete destruction. His prophecies are among the most helpful of the Old Testament, and are occupied with the future destiny of Israel.

JOHANNESBURG (yō-hän'nĕs-bûrg), an important city of South Africa, the mining center of the Witwatersrand gold fields, situated about thirty-five miles south of Pretoria. Three railroad lines were opened to it in 1892, giving it connection with Delagoa Bay, Cape Town, Dunbar, Point Elizabeth, and other important points. Immediately immigration centered there, and an important commerce developed, manufactories were established, and numerous churches, hotels, banks, and other institutions were founded. It had a population of 40,000 in 1895, with fully 32,000 additional inhabitants in the adjacent gold fields. The streets are platted on a regular plan, buildings solid and substantial, and it is now the seat of much commercial enterprise. In 1895 the famous Jameson raid was made upon the city, which resulted in the capture of the insurgents, and four of the principal leaders were sentenced to death, but the sentence was afterward commuted to a cash payment of $125,000 each. The fortifications constructed by the Boers long prevented British occupation in the war of 1900. At present the city is prosperous and one of the principal trade centers in that region of Africa. Population, including several suburbs, 88,000.

JOHN, the name of twenty-three popes, who reigned within the period from 523 to 1417, and of whom John VIII. and John XXIII. are the most noteworthy. The former was pope from 872 to 882. He succeeded Adrian II., and attained remarkable success in overcoming Saracen influences. John XXIII. reigned from 1410 to 1415. He was of noble descent, and became noted because of prolonged controversies regarding papal succession with Gregory XII. and Benedict XIII. See **Pope**.

JOHN, surnamed **Lackland**, king of England, youngest son of Henry II., born in Oxford, England, Dec. 24, 1165; died Oct. 19, 1216. When nineteen years of age, he took charge of the government of Ireland under a lordship, but his weak management caused his recall in 1186. Shortly after he joined his four older brothers against his father, which occasioned much grief to Henry and hastened his death. Henry II. was succeeded by Richard I., but the latter died soon after, and John was crowned king of England at Westminster on May 27, 1199. He promptly seized Arthur, son of Geoffrey, the rightful heir to the English throne, and imprisoned him at Rouen, France, and shortly afterward caused him to be executed privately. The reign of John was one of much military activity. It became distinguished on account of reducing the forces of William of Scotland, suppressing a rebellion in Ireland, and conquering the reigning prince in Wales. Soon after he confiscated the property of the Roman Catholic Church in his dominion, which led the pope to depose him in 1212 and permit his subjects to organize a revolution, when England became a dependence of the papal see. On June 15, 1215, the army required him to sign the Magna Charta, known as the Great Charter, which became the basis of the constitution of England. Soon after another uprising occurred, in which the dauphin of France aided the barons, landing in England in May, 1216. The French army occupied the greater part of the country within three months, when English mistrust of the foreigners reacted in favor of John, though he died soon after at Newark as the result of an accident which occurred while marching across the Wash.

JOHN II., king of Poland, second son of Sigismund III., born March 21, 1609; died Sept. 16, 1672. He traveled extensively in the continental countries of Europe. In 1640 he joined the Jesuit order at Rome, was chosen cardinal shortly afterward, and on Nov. 20, 1648, succeeded his brother to the throne of Poland. His reign was marked by several wars against Russia and Sweden, in which the Polish army was successful and the dominion of the Polish crown was extended by the addition of several provinces. In September, 1668, John abdicated and became an abbot at Nevers, France.

JOHN III., John Sobieski, king of Poland, born in 1624; died June 17, 1696. He and his brother Mark received a liberal education under the direction of their father, John Sobieski, at the city of Cracow, in Galicia. After traveling extensively in France, Germany, Italy, and Britain, the brothers returned in 1648 to attend the funeral of their father, who had died sud-

denly. At the battle of Pilawiecz the Russians defeated the Poles, which induced the brothers to organize an army and battle for the independence of their country. Mark was slain in a decisive battle on the banks of the Bog River, but John was more fortunate and distinguished himself. He rose rapidly in the admiration of his countrymen and became an important factor in military forces. On Nov. 11, 1673, he commanded the Polish forces at Kotzim and defeated the Turks with much slaughter. The following year he was elected king of Poland, securing the crown at Cracow. In 1683 he organized an army of 20,000 which he led against the Turks, who had besieged Vienna, united with the German army, and was successful in driving the Turks from their intrenchments. Unbounded enthusiasm prevailed as he entered Vienna with the banner taken from the Turks, but subsequently he was less successful in warring against the forces of the Ottoman Empire. John III. was a patron of learning, possessed a gentle disposition and agreeable manners, and fostered internal improvements and industrial arts.

JOHN I., known as Joan the Great, king of Portugal, son of Pedro I., born in Lisbon, April 22, 1357; died Aug. 11, 1433. His brother, Ferdinand I., died without male issue in October, 1385, which led to a controversy between him and other claimants, but he was recognized two years later. However, the king of Castile resorted to arms in favor of the infant princess Beatrice, but at the battle of Aljubarota, on Aug. 14, 1385, John's army succeeded in securing a decisive victory. In 1415 he commanded in a war against the Moors, which resulted in annexing Ceuta to his dominion. His reign was one of much prudence, ability, and success, and at his death he was succeeded by his son, Edward.

JOHN II., known as John the Perfect, king of Portugal, born in Lisbon, in 1455; died in October, 1495. He succeeded his father, Alfonso V., to the throne of Portugal, Aug. 29, 1481. His reign is distinguished by the curtailment of power among the aristocracy; the execution of the duke of Braganza, in 1483, and of the Duke Viseu for conspiracy. The expedition of discovery sent out by him under Diaz made him famous. This expedition discovered the Cape of Good Hope. In 1493 he aided in equipping a squadron for exploring the new world discovered by Columbus. The navigators sent out by John II. included Da Gama, who visited India, and others who made extensive explorations on the coast of Africa.

JOHN, Saint, apostle and evangelist, son of Zebedee, and fisherman of the Sea of Galilee. He and his brother James were born in Bethsaida, and he followed in his father's occupation until called to be a disciple of Christ. It appears from available history that he attended the preaching of John the Baptist as a disciple at Bethany, and that he there formed the personal acquaintance of our Lord. The four gospels relate the events of his life, from the time he was called as a disciple of Christ until the ascension. After the ascension John witnessed the outpouring of the spirit on the day of Pentecost. He first ministered in Jerusalem and Samaria, and subsequently settled in Ephesus. His testimony to the resurrection given at Jerusalem is among the most prominent of that event, and later he again visited the Jewish capital in connection with Paul. The persecutions during the reign of Emperor Domitian caused him to seek safety on the Isle of Patmos, where he witnessed the visions narrated in the Book of Revelation. He returned to Ephesus in the reign of Nero, and probably died there in 58 A. D. His death is distinguished from the demise of the other disciples in that they all suffered martyrdom, he alone dying from natural causes. John possessed affection and tenderness of nature, and was characterized as "the disciple whom Jesus loved." When dying, he uttered, "Little children, love one another." His writings include the Book of Revelation, the gospel that bears his name, and three epistles, though some think he was assisted by others in at least some parts of the latter.

JOHN FREDERICK, elector of Saxony, son of John the Constant, born in Torgau, Germany, in 1532; died in 1554. He succeeded his father as elector and distinguished himself as an advocate of the Reformation, to which he rendered material aid by commanding the Protestant army against Charles V. At the battle of Muhlburg he was taken prisoner, and there condemned by court-martial, but later was liberated through the efforts of Maurice of Saxony.

JOHN GEORGE I., elector of Saxony, successor to his brother, Christian II., born in 1585; died in 1656. In 1611 he succeeded to the electorship. He aided the Protestant cause by heartily co-operating with the German princes and by furnishing valuable supplies for subsistence and defense.

JOHN OF AUSTRIA, Don, son of Emperor Charles V. and Barbara Blomberg, born in Ratisbon, Germany, Feb. 24, 1545; died Oct. 1, 1578. He was brought up chiefly at the Castle Villa Garca in Spain, given a liberal education, and provided for by his father settling a handsome income upon him out of the revenues of Naples. Philip II., his half-brother, recognized him as a member of the royal family in 1559, and he was given an education in connection with the Infant Don Carlos and Prince Garma. Philip intended Don John for the church, but the latter preferred military life, and in 1570 he secured a command in an expedition against the Moors, who had rebelled in Granada. In August he occupied the entire Alpujarras mountain region, and

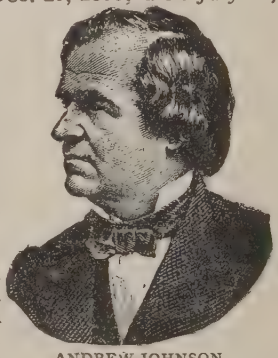
distinguished himself otherwise by courageous conduct, which led to general military success. In 1571 he defeated the Turks in the famous battle of Lepanto, which was a decisive struggle between the West and the East, and inspired the Christians with ecstatic joy. His brother soon after appointed him viceroy of the Netherlands, in which position he made radical changes in military discipline and promoted interior improvements. New honors were gained by him in 1577 by defeating William of Orange, and he actually caused Philip to fear that he would take advantage of his popularity and influence by making himself king over many of the Spanish possessions. He died suddenly, perhaps of poison, at Namur, Belgium.

JOHN OF GAUNT, fourth son of Edward III. and his queen, Philippa, born at Ghent, Belgium, June 24, 1340; died Feb. 3, 1399. Edward II. made him duke of Lancaster; later he served in the war against France, and afterward became governor of Guienne, France. He married Constance, daughter of Peter the Cruel, king of Castile, in 1370, and in the right of his wife claimed the throne. To assert his rights he invaded the kingdom, but afterward relinquished them in favor of his son-in-law, Prince Henry of Castile. Bolingbroke, eldest son of John of Gaunt, became king of England as Henry IV.

JOHNS HOPKINS UNIVERSITY, an institution of learning at Baltimore, Maryland, founded by Johns Hopkins (q. v.). It is non-sectarian. There are provisions for the instruction of undergraduates desiring the degree of bachelor of arts; for students who study with the view of securing advancement in special lines, and for those who desire advanced work leading to the degree of bachelor of philosophy. Its courses embrace biology, pedagogy, modern languages, economics, Latin, Greek, Semitic, Sanskrit, and other advanced branches. The publications of the university include periodicals devoted to the various lines, while many useful organizations are maintained. There are 138 instructors, an average of 750 students, and a library of 98,000 volumes. The annual income is adequate to further the work successfully. Among the endowments are investments of $3,000,000 in stock of the Baltimore and Ohio railroad, and other similar securities. The institution ranks among the most prosperous of America, and is open alike to both sexes.

JOHN THE BAPTIST, the last of the prophets, forerunner of Christ, son of the priest Zacharias and Elizabeth. He was a cousin of the mother of our Lord, and flourished in the time of Christ. The circumstance of his birth and numerous incidents of his life are related in the New Testament. Much of his life was devoted to preparing the people for the coming of the Messiah. He baptized Christ and many others in the Jordan, was imprisoned by Herod Antipas, and later executed. The followers of John and those claiming to be his disciples flourished long after the spread of Christianity, while the Zabians still survive in Eastern countries. The latter claim direct descent from his early followers. June 24th is set apart as the day of John the Baptist.

JOHNSON, Andrew, seventeenth president of the United States, born in Raleigh, North Carolina, Dec. 29, 1808; died July 31, 1875. His father, Jacob Johnson, died from injuries received while rescuing a person from drowning, when Andrew was four years old. Since his parents were very poor, his early education was entirely neglected. He learned the alphabet from a fellow-workman while apprenticed to a tailor, at the age of ten years, and succeeded in borrowing a book from which he learned to read. In 1824 he removed to South Carolina, where he worked as a journeyman tailor, and in 1826 settled at Greeneville, Tenn., where he married Eliza McCardle, a woman of refinement, who taught him evenings to write and instructed him in the elements of arithmetic while at work during the day. His remarkable natural tact and ambition to learn enabled him to make material advancement, and he soon became a political leader. An organized party of workmen elected him alderman in 1828, and in 1830 he was elected mayor, which office he held three years. In 1831 he was made trustee of Rhea Academy, and aided in organizing a literary society at Greeneville College. He represented Greene and Washington counties in the legislature in 1835, was re-elected in 1839, and the following year made a state reputation by his force of oratory in advocating the election of Martin Van Buren. In 1841 he was elected to the state senate from Greene and Hawkins counties, widened his influence by efficient services and advocacy of progressive legislation, and in 1843 was elected to congress as a democrat.


ANDREW JOHNSON.

In congress he supported the annexation of Texas and the resolution to restore to General Jackson the fine imposed upon him at New Orleans, and served in that body until 1853. Subsequently he was twice elected governor of Tennessee, and in 1857 became a member of the United States senate. The Kansas-Nebraska bill received his support; but he opposed the Union Pacific railroad grant, favored the homestead law, and opposed all schemes directed to disorganize

the Union. He held his seat in the senate until President Lincoln appointed him military governor of Tennessee, in 1862, in which capacity he rendered valuable services to the Federal cause. In 1864 he was elected vice-president on the ticket with President Lincoln. On April 15, 1865, Johnson succeeded Lincoln as president, the latter having been assassinated the day before. The administration of President Johnson is memorable in history on account of the prolonged contest between him and congress on the reconstruction policy and the readmission of the seceded states. The first breach was the veto, in 1866, of the Freedmen's Bureau bill, which was designed to protect the Negroes, and this was followed by the veto of the civil service bill, the veto of the congressional plan of reconstruction, and the tenure-of-office bill in 1867. In 1866 he suspended and then removed Secretary Stanton, and was forthwith impeached by the house of representatives. The trial by the senate took place from March to May, 1868, and resulted in his acquittal, his opponents having one less than the necessary two-thirds vote. In 1869 President Johnson temporarily retired to private life, but was again elected United States senator in 1875, and held his seat at the extra session of that year. His death occurred while visiting his daughter near Elizabethton, Tenn., and the remains were interred at Greeneville.

JOHNSON, Eastman, artist, born in Lovell, Maine, July 29, 1824. He became devoted to art work at the age of seventeen, studied ten years in Dusseldorf, Germany, and resided four years at The Hague, where he executed numerous portraits in oil. After visiting the principal art galleries of Europe, he returned to America and settled in New York in 1858. He was elected a member of the National Academy in 1860. His favorite subjects are those relating to rural and domestic life, and among American products these take a very high rank. They include "Corn Husking 'Bee;" "Old Kentucky Home;" "Boyhood of Abraham Lincoln," and "School of Philosophy at Nantucket."

JOHNSON, Reverdy, statesman, born in Annapolis, Maryland, May 21, 1796; died Feb. 10, 1876. He studied at St. John's College, completed a law course, and in 1815 was admitted to the bar. He settled in Baltimore in 1817 to practice his profession; was elected a member of the state senate in 1821, and of the United States senate in 1845. President Taylor appointed him attorney-general in 1849, and in 1863 he was again elected to the United States senate. In 1868 he became minister to England, where he negotiated the Johnson-Clarendon treaty. This treaty was rejected by the senate, but the objects intended to be secured by it were later adjusted in the settlement of the Alabama Claims. He returned to the United States in 1869, resumed the practice of law, and continued to manifest profound thought and marked prudence in adjusting and treating law questions.

JOHNSON, Richard Mentor, vice-president of the United States, born at Bryant Station, Kentucky, Oct. 17, 1781; died Nov. 19, 1850. He studied at Transylvania University, was admitted to the Kentucky bar, and served in the legislature from 1804 to 1807. In 1807-19 he was a republican-democratic member of congress, rendered efficient service in the War of 1812, and served as United States senator from 1819 to 1829, when he was again elected representative, serving until 1837. The senate chose him vice-president of the United States in 1837, and he served in the office during the presidency of Martin Van Buren. After retiring from the vice-presidency, he was elected to the state legislature of Kentucky, and served in that capacity until his death. As a statesman he was noted for his honorable and extended legislative career, and as a citizen on account of pleasant manners and a kind disposition.

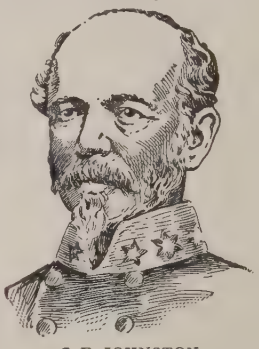
JOHNSON, Samuel, eminent author, born in Lichfield, England, Sept. 18, 1709; died Dec. 13, 1784. He was the son of Michael Johnson, a magistrate of Lichfield; received his early education in his native town, and in 1829 attended Pembroke College, Oxford. While a student at that college he was oppressed by debts and various difficulties, which preyed on his melancholy spirit, while poverty prevented him from securing his degree. Subsequently he engaged in school teaching, but failed on account of being illy adapted to the art of school government and the instruction of youth. After leaving the school-room, he supported himself by making translations for the press and working for booksellers at Birmingham. He married Mrs. Potter in 1736, and through her secured property interests valued at about $4,000. After studying special branches with ill success, he repaired to London and became a contributor to the "Gentleman's Magazine." His first poem, entitled "London," which was published in 1738, was mentioned favorably by Pope and other men of standing, though his remuneration was very small for the work he produced. He worked from 1747 to 1755 on his dictionary, which he made a valuable aid in reference and study, and by it became the founder of English lexicography. From this time on he was more successful and became recognized as an important factor in English literature. Shortly afterward he was granted a pension of $1,500 per year. Johnson possessed keen ability to observe character, caustic wit, and remarkable aptitude to treat moral themes with sage solemnity. His deficiency as an abstract thinker and inventor forbade his becoming either a poet or a philosopher, but his keen intellect and common sense appealed to the mass of people and rendered his productions practical and utilitarian.

Among his writings not named above are "Life of Richard Savage;" "Vanity of Human Wishes;" "Rasselas;" "The Rambler," and "Lives of the Poets."

JOHNSON, Sir William, colonist and general, born in Warrentown, Ireland, in 1715; died in Johnstown, New York, July 11, 1774. It was designed that he should pursue a mercantile career, but in 1738 he engaged with his uncle, Sir Peter Warren, to manage a large tract of land on the Mohawk River, New York. He commenced to colonize the land and to promote trade with the Iroquois Indians, in both of which he was successful. By direct intercourse with the Mohawk tribe he learned their language, and was made a sachem by election. His value was recognized by Governor Clinton, who appointed him Indian commissioner for New York. At the time of the French and Indian War he was given a baronetcy and a cash fund of $15,000, this being in recognition of his success against General Dieskau in the battle of Lake George on Sept. 5, 1755. Later he was made superintendent of the Six Nations with a salary of $3,000, in which position he rendered such valuable service to the British cause that the king granted him a royal patent for 100,000 acres of land north of the Mohawk River. On this tract of land he established Johnstown, in Tyrone county. Later he secured a treaty with the Iroquois Indians, by which the frontier was extended westward to include Kentucky with Virginia as a British possession.

JOHNSTON (jŏn'stŏn), **Albert Sidney,** Confederate general, born in Kentucky, Feb. 3, 1803; slain April 6, 1862. He graduated from West Point in 1826, and served with distinction in the Black Hawk War. Soon after he entered the army of the republic of Texas, of which country he subsequently became secretary of war. He served during the Mexican War as inspector-general on the staff of Gen. W. O. Butler, and, when peace was secured became a planter. Shortly afterward he entered the United States army and rose to be paymaster and colonel. When the Civil War commenced, he espoused the Confederate cause, and became brigadier-general in command of the western forces. Soon after he fortified the strategic points of Bowling Green, and made an attack with 50,000 men on General Grant at Shiloh, April 6, 1862. The attack was one of the fiercest in the Civil War, and General Johnston was killed on the afternoon of the first day, while leading a charge. He ranked as an able general, not only among the Confederates, but among the military men of America. The oft expressed view that he was a brother of J. E. Johnston is erroneous.

JOHNSTON, Joseph Eggleston, Confederate general, born in Longwood, Virginia, Feb. 3, 1807; died March 21, 1891. He descended from a family of Revolutionary fame, his mother being a niece of Patrick Henry. In 1829 he graduated at West Point, and served in the Seminole War and the war with Mexico; in the latter chiefly as topographical engineer. He held the rank of brigadier-general at the outbreak of the Civil War, but resigned his commission, April 22, 1861, and entered the Confederate service as major-general of volunteers. Two weeks later he was commissioned brigadier-general and given command of a force in the Shenandoah valley, and on July 2, 1861, reinforced Beauregard at Bull Run. In 1862 he was severely wounded at the battle of Fair Oaks, and the next year was assigned to the command of the Confederate forces in the southwest with the rank of general, when he made an effort to relieve Vicksburg. The following year he commanded a force to intercept Sherman's march to the sea, but was compelled to fall back from point to point until President Davis appointed General Hood to supersede him in the command. General Lee placed him in command of all the forces of South Carolina, Georgia, Florida, and Tennessee, in 1865, with instruction to drive Sherman back, but he was unable to check the march on account of inferior numbers. Soon after the news of Lee's surrender reached him, he capitulated to Sherman at Durham's Station. After the close of the war he engaged in commercial and railroad enterprises, and was elected to congress in 1877. President Cleveland appointed him commissioner of railroads in 1885, which position he retained until his death. Johnston was a man of extended culture and ability. He was the highest in rank of the officers that left the Union army, but his plan of campaigning was not in entire accord with the views of President Davis, who assigned him fourth in command of the southern forces, though Johnston protested for a higher classification.



J. E. JOHNSTON.

JOHNSTOWN, county seat of Fulton county, New York, situated about forty miles northwest of Albany. It has superior municipal facilities, enjoys a growing commercial trade, and manufactures gloves, shoe leather, cigars, machinery, and knit goods. Besides the courthouse, which is a fine structure, there are excellent school and church buildings, an opera house, and many fine business blocks. Gas and electric lights, pavements, street railways, public parks, and a library are among the municipal facilities. There is a large and growing trade. Population, 1900, 10,130.

JOHNSTOWN, a city of Cambria

county, Pennsylvania, at the confluence of Stony Creek and Conemaugh River, about forty miles southwest of Altoona. It is surrounded by a country rich in coal, fire-clay, and iron deposits. There are excellent railroad facilities, and it is largely interested in manufactures. The capital invested aggregates $14,500,000, and the average annual production $19,500,000. It contains good schools, several excellent libraries, numerous churches, and public parks. There are extensive street railway systems, waterworks, pavements, gas and electric lights, and other improvements. The city was almost totally destroyed May 31, 1889, by the bursting of a dam in the Conemaugh River, which formed Conemaugh Lake above. The total loss of life was 2,500 persons, and ninety-nine entire families were lost. Contributions sent for the relief of the sufferers amounted to $4,116,801.58. Since then the city has rapidly recovered from this calamity and is enjoying rapid development in trade and wealth. Population, 1900, 35,936.

JOINVILLE (zhwăn-vēl'), **Prince de**, celebrated soldier, third son of King Louis Philippe, born in Neuilly, France, Oct. 14, 1818; died June 16, 1900. After studying in the College of Henry IV., he took a course of instruction in the naval school of Brest. He became a lieutenant in the French navy in 1836, four years later commanded the frigate which brought the remains of Napoleon from St. Helena to France, and in 1843 married the daughter of Dom Pedro I., emperor of Brazil. In 1844 he commanded the fleet engaged in the interest of France against Morocco, and was made vice-admiral for distinguished services. He removed to America in 1861, and, together with his two nephews, served in the Civil War under McClellan. He lived in retirement in France after 1871, though he served for a brief period in the French national assembly, and later published several books relating to military subjects.

JOLIET (jō'lę-ĕt), a city in Illinois, county seat of Will county, on the Des Plaines River, forty miles southwest of Chicago. It is surrounded by a fertile agricultural and dairying district, which also produces an excellent quality of Silurian limestone and bituminous coal. There are numerous manufacturing establishments and a large jobbing trade. The total capital invested in manufacturing enterprises aggregates $10,000,000, while the average annual output is valued at $13,500,000. Among the productions are flour, lime, lumber products, pottery, farming utensils, tombstones, cigars, bridges, furniture, and Bessemer steel. Besides its excellent school system, it contains a Catholic academy, a convent, and a state prison. Among the general facilities are electric railways, systematic street lights, waterworks, pavements, and a public library with 12,000 volumes. Population, 1900, 29,353.

JOLIET (zho-le-ā'), **Louis**, noted explorer, born in Quebec, Canada, Sept. 21, 1645; died in May, 1700. He was educated at the Jesuit College of Quebec with a view of entering the priesthood, but decided to become an explorer and trader. Soon after he spent a number of years as a trader among the Indians, and thereby acquired the use of their language, and learned much of the geography of what was then considered the West. In 1672 he was selected by Governor Frontenac to explore the Mississippi River. He was joined in this enterprise by Father Marquette and six others, and by Dec. 8, 1672, had proceeded as far as Mackinac. Through information secured from the Indians they outlined a map of their proposed route. They ascended the Fox River from Green Bay, then descended the Wisconsin River, and entered the Mississippi on June 17, 1673. After floating down the river below the mouths of the Ohio and Missouri and visiting several Indian villages, they became assured that the river flows into the Gulf of Mexico, and proceeded on their return journey. In September they reached Winnipeg, where they wintered at the mission of St. Francis Xavier, and returned to Quebec in 1674. The maps and papers prepared by Joliet were lost by his canoe upsetting in the St. Lawrence River. However, this misfortune was overcome, as the notes prepared by Marquette furnished ample data. In 1680 Joliet secured a grant of Anticosti Island, where the British destroyed a fort built by him and took his wife prisoner. Subsequently he explored Labrador, and was granted the seigniory of Joliet Island, near Quebec.

JOMINI (zho-me-nee'), **Henri, Baron**, historian and soldier, born in Payerne, Switzerland, March 6, 1779; died in Passy, France, March 24, 1869. He showed early preference for military activities, was appointed a chief secretary of war in 1798, and in 1801 became aide-de-camp to Marshal Ney. He began to publish treatises on military tactics in 1804, and the following year presented several publications to Napoleon on the field of Austerlitz, by which he secured the warm friendship of that military genius. He accompanied Napoleon at the battle of Jena, was later created a baron, and in 1808 took an efficient part in the Spanish campaign. Subsequently he rendered valuable aid to Napoleon during the retreat from Moscow, and later at the battle of Lutzen, but, after Napoleon's second campaign against the Russians, he joined the allied forces against Napoleon and gave them the benefits of his extensive military experience. In 1814 he entered the Russian army, aided in the capture of Varna from the Turks in 1828, and in 1855 settled at Brussels. His writings on military tactics and history are important and voluminous productions.

JONAH (jō'nah), a Hebrew prophet

resident at Gath-Hepher, in Galilee, son of Amittai. He flourished in the latter part of the 8th century B. C., during the reign of Jeroboam II. The history of Jonah is recounted in the Book of Jonah. Ernst Friedrich Rosenmüller (1768-1835), the German orientalist, and other critics urge that the Book of Jonah is an allegory founded on the Phœnician myth of Hercules rescuing Hesione from the sea-monster by jumping into its jaws and tearing its entrails. The design of the history is to show that God will not permit his merciful intentions to be frustrated by the disobedience even of a prophet. Orthodox theologians preclude the possibility of this theory and prove that it is strictly historical by the language of Christ (Matt. xii. 39), and the manner in which it is mentioned by Josephus and the Apocrypha. At Nebi-Yunus, near Mosul, is a tomb still shown as that of the prophet Jonah.

JONATHAN, a son of King Saul, an heir to the Jewish throne, and the friend of David. His character is a very admirable one. Having early formed a friendship for David, he remained faithful through all the jealousy and hatred with which his father sought David's destruction, and even when he knew that David was anointed to take the kingly crown that rightfully belonged to him. The "love of David and Jonathan" is proverbial. Saul, Jonathan, and two brothers of the latter were killed in a battle with the Philistines on Mount Gilboa.

JONES, James Kimbrough, soldier and statesman, born in Marshall county, Miss., Sept. 29, 1839. He enlisted as a Confederate soldier in the Civil War, began to practice law in 1873, and the same year became a member of the state senate of Arkansas. After several efficient terms in that capacity, promulgating progressive views relative to education and industrial interests, he was elected to congress in 1880, and again in 1882 and in 1884. Before the end of the last term in the house, he was elected to the United States senate, taking his seat in 1885, and was reëlected in 1890 and again in 1896. His legislative career was one of marked influence and led to his selection as the chairman of the democratic national committee in 1896. In that capacity he served a number of years and proved an efficient organizer in the interest of bimetallism, civil service reform, and international commerce, especially in the presidential campaign of 1900.

JONES, John Paul, naval commander, born at Arbigland, Scotland, July 6, 1747; died July 18, 1792. He descended from a line of respectable ancestors, became a sailor in the merchant marine, and settled in Virginia shortly before the Revolutionary War. He volunteered his services in the interest of American independence shortly after the opening of hostilities, was appointed first lieutenant, and made a number of successful cruises. In 1777 he sailed to France, where he established headquarters at Brest and conducted a remarkable expedition to the British coast in his ship, the Ranger, being greatly aided by his special knowledge obtained from his former residence. He took several prizes in St. George's Channel in 1779, shortly after captured the British vessel Drake, and with his own vessel, the Bon Homme Richard, made a daring cruise along the eastern shore. Off Scarborough he encountered several British ships of war, and fought one of the fiercest naval battles on record on the evening of Sept. 23, 1779, in which he destroyed the Serapis. Congress voted thanks to Jones, and Louis XVI. presented him a gold sword. In 1788 Catharine, empress of Russia, engaged him as rear-admiral in the war against Turkey, his successes on the Black Sea proving a source of much benefit to the Russians. Later he settled at Paris, where his death occurred.

JOHN PAUL JONES.

JONSON, Ben, poet and dramatist, born in Westminster, England, in 1574; died Aug. 6, 1637. He descended from Scottish parents, who settled at Carlisle, and was educated in the Westminster schools under William Camden. He began his literary career at an early age, though his first efforts were as an actor. His early fame rested upon the production, "Every Man in His Humor," which appeared in 1598, and one part was acted by Shakespeare. The most noted of his subsequent works are "The Silent Woman;" "The Alchemist;" "Masques," and "Catiline's Conspiracy." His "Masques" was written for the courts of James and Charles, and these monarchs granted him a pension, but his careless habits in the management of personal affairs kept him in constant difficulties and poverty. Most of his writings are marked with a pedantry that gives rather a dampness to his humor, while his lyrics exhibit an example of lightness and delicacy. He exercised marked influence by strength and talent in wit, Shakespeare being his only match in that particular phase of literary strength. His disposition and constitution were impaired by strong drink, and during the last few years he was closely confined to his room. The remains were buried in Westminster Abbey, where a monument bears the inscription, "O rare Ben Jonson." "The Sad Shepherd," a drama of much beauty, was left unfinished by reason of a sudden palsy stroke.

JOPLIN (jŏp'lĭn), an important city and railroad center of Jasper county, Missouri, situated about fifteen miles southwest of

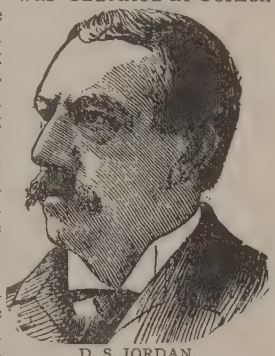
Carthage. Joplin came into prominence within recent years on account of the discovery of valuable zinc and lead deposits, which developed extensively and caused a large number of railroads to center there. The average annual output of zinc ores within the adjacent district is valued at $5,000,000. Large quantities of fruits are produced in the vicinity. The city has a fine public school system, numerous churches, electric railways, street lights, and other municipal facilities. Among the manufactured products are machinery, ironware, cigars, steam boilers, soap, and flour. The smelting works and foundries give employment to a large number of laborers. There is an important trade in produce and merchandise. The population, in 1890, was 9,943; in 1900, 26,023.

JOPPA, or **Jaffa**, a city in Palestine, thirty-three miles northwest of Jerusalem, on the seacoast of Syria. It is a very ancient city, and in the time of Solomon was the port of entry to Jerusalem, being the place to which the cedars of Lebanon were floated from Tyre for the building of the temple. The Jewish prejudice concerning the Gentiles and the Christian religion was corrected after a vision seen by Peter at Joppa. In the time of the Crusades the city reached its highest prosperity, being the principal place of landing. The French under Bonaparte captured it in 1799; in 1832 Mehemet Ali became master, but the Turks, with the assistance of the Austrians and British, took possession in 1840. At present Joppa is an export city for livestock, cereals, fruits, and various manufactures. In September, 1892, it was made the terminus of a railroad to Jerusalem. Population, 17,250.

JORDAN (jôr'dan), a celebrated river of Palestine, lying in a valley that stretches from north to south in the eastern part of Syria. It has several sources, rising in the southern declivities of the Libanus and Anti-Libanus, is 150 miles long, and its mouth is 1,312 feet below the surface of the Mediterranean. In its course from Mount Hermon and Mount Lebanon to the Dead Sea it passes through the lakes of El Huleh (the waters of Merom) and Bahr Tubariyeh (Sea of Galilee or Tiberias). Its bed varies greatly in breadth, many places having rocky and precipitous banks, while others are flat and sandy. The average width of the Jordan is from thirty to fifty yards. It is spanned by very few bridges, the one most famous being Jacob's bridge, situated north of the Sea of Galilee. The total fall of the Jordan is 2,300 feet. Many Christians regard it a special privilege to be baptized in the Jordan, from the circumstance that Christ was baptized in the stream by John.

JORDAN (zhŏr-dŏn'), **Camille**, statesman, born in Lyons, France, Jan. 11, 1771; died May 19, 1821. His active resistance to a republican government caused his proscription by the directory in 1793, and he fled for safety to Switzerland, and later to London. He returned to Lyons in 1796, and the following year was elected as a deputy to the council of five hundred, before which he advocated religious liberty. After the Revolution he resided in Germany, where he met Goethe and became imbued with a deep interest for German literature. The consulate party recalled him in 1800, when he opposed Bonaparte and boldly exposed the ambitious schemes of the first consul. Louis XVIII. appointed him counselor of state. In 1816 he was elected to the chamber of deputies, and during the intervening periods devoted himself to literature. His speeches and writings were published several years before his death.

JORDAN, David Starr, naturalist and educator, born in Gainseville, New York, Jan. 19, 1851. He was educated at Cornell University and the Indiana Medical College; taught at Lombard University, Illinois, in 1872, and later at various other important educational centers. In 1891 he was elected president of the Leland Stanford, Junior, University, where he exercised a wide influence on educational thought. Dr. Jordan is noted as a lecturer and writer on various subjects, including psychology, natural sciences, and ichthyology. Among his most important works is "Manual of the Vertebrates of the Northern United States."



D. S. JORDAN.

JORULLO (ho-rōōl'yō), a volcanic mountain about 150 miles west of the city of Mexico, thrown up by volcanic force on Sept. 29, 1759. It consists of numerous cones, some of which give out vapor. The highest elevation is 4,250 feet above sea-level. Owing to the gradual loss of temperature, foliage and forest trees have slowly moved upwards and now cover most of the region.

JOSEPH, the husband of Mary the mother of Christ. He descended from the house of David, and was by trade a carpenter. Joseph is not spoken of after Jesus was twelve years old. It is thought probable that he died before the crucifixion. March 19 is assigned as his festival.

JOSEPH, the favorite son of Jacob and the eldest by his wife Rachel, Benjamin being his only brother, but he had ten older half-brothers. Jacob's preference for Joseph made the elder brothers envious. When occasion presented itself, he was sold to some slave dealers, who in turn sold him to Potiphar, an officer of Egypt, the brothers

reporting him killed to Jacob. The story of the life of Joseph is given in Genesis and relates his advancement under Pharaoh; his power in interpreting dreams; his ability in business affairs; his abhorrence of sin; his making himself known to his brothers, and later to his father, and saving them all in the time of famine. Joseph died in Egypt, was embalmed, and his remains were taken to Shechem in the land of Canaan, but neither the time of his death nor of his history is known, some authorities placing it before and some after the Hyksos or Shepherd kings of Egypt. He was 110 years old when he died, leaving two sons, Manasseh and Ephraim. As the two sons of Joseph were adopted by Jacob, they received a place among the heads of the tribes.

JOSEPHINE (jo'ze-feen), **Marie Rose**, empress of France, born in the Isle of Martinique, June 23, 1763; died in Malmaison, France, May 29, 1814. She received only an ordinary education, but her excellent qualities of heart and natural intellectual faculties, coupled with beauty of form and feature, won her universal regard. In her sixteenth year she married Viscount Beauharnais, and was the mother of two children—Eugene, viceroy of Italy, and Hortense, queen of Holland. During the reign of terror in France Josephine's husband was executed, and about two years later, on March 9, 1796, she married Napoleon Bonaparte. For fifteen years Josephine saw the sun of Napoleon's ambition rise, going with him on his campaigns, advising noble deeds and purposes, and restraining, if his ambition suggested measures of violence or cruelty. Josephine had no children by Napoleon, hence there was no lineal heir to the throne, and on Dec. 16, 1809, after most painful scenes, the marriage was dissolved. During Josephine's life at the Tuileries she attracted the most brilliant society of France, but after her divorce she remained secluded, retaining the title of empress and sympathizing with Napoleon in his defeat. Had the allied forces been magnanimous enough, she would have rejoined him in his exile on St. Helena.

EMPRESS JOSEPHINE.

JOSEPHUS (jo-see'fus), **Flavius**, celebrated Jewish historian, born in Jerusalem in 37 A. D. His lineal descent was in both the royal and priestly lines. Accordingly he was carefully educated in the Greek and Hebrew, which early developed his brilliant faculties, and at the age of twenty-six he was chosen delegate to Nero. When the last fatal trouble with the Romans began Josephus was appointed governor of Galilee and for forty-seven days of desperate resistance held the city of Jotapata against the advance of Vespasian. After the fall of the city he remained a paroled captive for three years, and was present at the fall of Jerusalem in 70 A. D. From his autobiography we learn that he went to Rome and devoted himself to literary studies. He was married three times, and is known to have survived Agrippa II., who died in 97, but his death is not recorded. However, it is assumed that he died in the year 100. Among his principal literary works are "History of the Jewish War;" "Jewish Antiquities," and "Autobiography."

JOSHUA (jŏsh'u-à), celebrated Hebrew warrior, son of Nun, of the tribe of Ephraim, and successor of Moses. He had been chosen by Moses to succeed him as commander of the forces of Israel before the Israelites had reached Sinai, and was vested with the whole civil and military government by the great law-giver shortly before his death. Joshua was born in Egypt, and he and Caleb alone of all the hosts that left that land were permitted to enter the promised heritage. He led the Israelites over the Jordan, and in seven years conquered the greater part of Palestine and divided it among the twelve tribes. The Book of Joshua is believed by modern scholars to be the work of several authors, some of whom probably lived long after Joshua's death. He died in Mount Ephraim at the age of 110 years.

JOSIAH (jo-sī'ah), king of Judah, born about 649 B. C., and began to reign when eight years of age. He early manifested a pious disposition and grew up under the careful instruction of the priests, becoming a determined religious reformer, establishing in Jerusalem, Judah, and Israel the worship of God. In repairing the temple the high-priest, Hilkiah, found the "Book of the Torah" which excited the profoundest emotions in the breast of Josiah, containing as it did directions for the great reform which he was conducting with such energetic vigor. Commentators believe the book to have been Deuteronomy, while others think it may have been Exodus or the Pentateuch. Josiah was slain at the battle of Megiddo, in the Esdrælon valley, whence he had gone to assist the king of Assyria against Pharaoh Necho of Egypt.

JOTUNS (yŏ'-tunz), the name of immense giants and magicians, especially those spoken of in Scandinavian mythology. They are credited with living in dark caves in their kingdom known as Jotunheim. The Jotuns were thought to be destructive forces and the possessors of much cunning, but had an inferior intellect. They are represented as being skilled in the arts of witchcraft.

JOUBERT (zhoo-bêr'), **Barthelemy Catherine**, eminent general, born in Pont

de Vaux, France, April 14, 1769; died Aug. 15, 1799. He studied to become an advocate, but entered the army at the outbreak of the Revolution, and in 1795 was promoted general of a brigade. After driving the Austrians from Mantua, in 1797, Napoleon sent him to Paris with the trophies of the campaign. In 1798 he served as general-in-chief in the army of Italy, captured Piedmont and Turin, and was killed in the charge at Novi.

JOUBERT, Petrus Jacobus, eminent soldier, born in Cape Colony in 1834; died in Pretoria, March 27, 1900. He came from a family of Dutch-French descent, who had settled in South Africa in 1687 to escape the persecutions that followed the revocation of the Edict of Nantes. After obtaining an elementary education, he settled in the vicinity of Majuba Hill as farmer and stock-raiser. He served for some years in the volksraad, and in 1870 became attorney-general of the Transvaal Republic. In 1880 he was chosen commander-in-chief of the Boer army, and rendered efficient services in numerous battles, including the decisive struggle at Majuba Hill. He was a member of the executive council for twenty years, in which time he showed himself a true friend to independent government, a progressive citizen, and an efficient defender of popular rights.

JOURNALISM, the business of managing, editing, or writing for newspapers or other periodical publications, which, as a business, has come to be one of the important occupations in the promulgation of knowledge and the diffusion of intelligence. Within recent years periodicals have been founded in practically all parts of the world inhabited by civilized and semi-civilized peoples. They have come to be regarded important avenues for the spread of news, and for instruction in politics, morals, arts, industries, theology, sport, and sociology. At the time of the operations of the Roman imperial armies accounts were published regarding their movements. These were under the direction of the generals and served as communications of intelligence to the officers of the different divisions, and are regarded the first systematic means of bearing tidings. Modern journalism dates from the 15th century and had its beginning in Germany, the first newspaper sheets being issued regularly in St. Augsburg, Nuremberg, Ratisbon, and Vienna. However, the first publication resembling newspapers published at the present time was the "Notizie Scritte," established at Venice in 1566. The name applied to this publication caused the word gazette to be coined, and shortly after gazettes were issued regularly in many of the large European cities.

Nathaniel Butter founded the first newspaper in England, which appeared as the "Weekly News" in 1662, and in the same year the "London Weekly Courant" was established. The latter was published as a daily in 1702, but consisted only of a small sheet printed on one side. Advertisements did not appear in periodicals until the latter part of the 17th century, and came to be inserted on account of notices given to new books as they were published. These notices attracted the attention of the public and led to the conclusion that advertisements of merchandise and other matters kept for sale would prove remunerative. At present newspaper advertisements are among the most profitable departments of the business, and are thought to be fully as remunerative to advertisers as to publishers.

It was estimated in 1901 that the number of newspapers in the world was 80,500, of which one-fourth were in the United States. The number credited to the United States is 20,000; Germany follows with 7,500; France, 4,600; Great Britain and Ireland, 4,500; Austria-Hungary, 3,950, and Italy, 1,800. In the other countries of Europe and in the other grand divisions the periodicals are limited to a smaller number, though more or less appear in all countries and are published in practically all languages. The first newspaper founded in America was "Publick Occurrences," in 1690. This was followed by the "Boston News Letter" in 1719, and immediately after many others were established in various parts of the colonies. They rapidly gained circulation among the people in towns, and later among those residing in districts remote from common centers. Benjamin Franklin was one of the early publishers to gain influence. He established the "Pennsylvania Gazette" in 1729, which was merged into the "North American" in 1745. Other noted journalists of America include James Gordon Bennett, founder of the "Herald," and Horace Greeley, founder of the "Tribune." Since then many great newspapers and other journalistic enterprises have developed in all the large cities of the United States. Many of the leading publishers have been induced by the rapid growth and phenomenal success in newspaper enterprises to invest their surplus capital in substantial fireproof buildings, which are used for publishing and general office purposes. These buildings are fine specimens of modern architecture, and add convenience to the management as well as serve to beautify the cities where located. Among the most prominent are those of the "New York World;" "New York Times;" "Washington Post;" "St. Paul Globe;" "Chicago Tribune;" "Seattle Intelligencer;" "San Francisco Chronicle;" "Portland Oregonian," and "St Louis Globe-Democrat."

Each newspaper has a business manager, whose business it is to make contracts with advertisers, keep the office records, purchase the necessary supplies, and attend to the payment of employees. The business manager works to the same end as the editor; both strive to make the publication of a newspaper successful and keep its tendency

in accord with the views of the owner. The editor has charge of the editorial work and supervises the reading matter that goes into the newspaper. Much of the general news is gathered and furnished by organizations known as press associations. The first association established to gather news was in New York City, though a number of newspapers prior to that furnished each other news under a local agreement, and this is quite commonly the case with newspapers at present. Intelligence syndicates have successful news-gatherers in all sections of the world, and also make arrangements with authors and special contributors at certain times for signed articles. These contributions are generally sold to one newspaper in a city, and are published by the different newspapers simultaneously.

The leading newspapers have branch offices in the various large cities for the purpose of both gathering news and distributing their daily papers to the public. These offices are managed by American companies, not only in the United States, but in Paris, London, Berlin, and other foreign cities, though more particularly for the purpose of gathering the news. The larger organizations send special correspondents to legislatures, congresses, and the seat of war for the purpose of having the news gathered and promptly telegraphed to the central office. Readers residing out of the city of publication receive their papers through the mails, through news venders, or buy them on the trains, while within the city of publication they are delivered largely by special carriers. The press is free in the United States to publish all matters, but may be held liable for damages or be subject to an action in libel. In most European countries a strict censorship is maintained over newspapers, while during the time of war the military authorities of the United States guard carefully the transmission of intelligence regarding military movements. The people of the United States are the most extensive readers of newspapers, largely because of the high state of literacy, rapid means of transportation, and remarkable business activity. It is estimated that the total number of separate newspapers published in the United States in 1896 was 4,681,113,530, but in 1901 the number reached the marvelous total of 6,500,000,000. The great daily newspapers are wonderfully productive in the amount of published matter of various kinds, covering all branches of knowledge and relating to all the countries of the world. This is true especially in the Sunday edition, which usually includes sufficient subject-matter to constitute a book of fair size.

JUAN FERNANDEZ (hoo-än′ fĕr-nän′-dĕth), an island about 400 miles off the coast of Chile, and which belongs to that country. The island was discovered in 1563 by a Spaniard whose name it bears. It is about thirteen miles long and four broad, rocky, mostly high, but with some parts fertile. The chief productions include cereals, cherries, peaches, figs, apples, grapes, melons, etc. It is famous on account of the story of Robinson Crusoe, written by Daniel De-Foe (q. v.), which is thought to be founded upon the solitary confinement and residence of Alexander Selkirk, a Scotch pirate, on the island of Juan Fernandez. Alexander Selkirk (1676-1723) quarreled with the captain, and at his own request was put off on the island, where he lived on fruit and wild goats for four years. The island is at present occupied by a number of Chilean settlements.

JUAREZ (hoo-ä′rĕs), **Benito Pablo**, president of Mexico, born in the state of Oaxaca, Mexico, March 21, 1806; died July 18, 1872. He descended from pure Indian parentage, received a good general education from a charitable friar, and began the practice of law in 1834. The liberal party elected him governor of his native state, in which position he served in 1847-52. After Santa Anna became dictator he was banished, but returned when the republic was restored in 1855. In the same year he was elected president of the supreme court of justice, a position equivalent to vice-president, and, when the liberal administration was overthrown in 1858, he became president. Shortly after entering upon the duties of the office, he was compelled to retreat to Vera Cruz, where his government received recognition by the United States in 1859. He entered the city of Mexico in 1861, was chosen president for four years, and shortly after the French declared war against Mexico and sought to force Maximilian upon the throne as emperor, but by obstinate resistance Juarez succeeded in maintaining Mexican independence. The reign of Maximilian came to an end in 1867, at which time he was shot under the direction of a court-martial, and Juarez secured an election for a second term. Numerous insurrections occurred, but his vigorous administration was proof against all uprisings calculated to overthrow the government. As a statesman and military leader he ranks among the most successful and eminent, his decisive conduct being largely instrumental in giving Mexico its present prosperity.

JUDAH, the fourth son of Jacob and Leah, and progenitor of the most numerous of the twelve tribes of Israel. When Joshua divided the land west of the Jordan, the portion extending south from Jerusalem to the boundary of the Amalekites, and between the Dead Sea and the Mediterranean, was allotted to the tribe of Judah. The royal house of David and Jesus Christ were descendants from Judah. See **Jews**.

JUDAS ISCARIOT (ĭs-căr′ĭ-ŏt), the betrayer of Jesus, one of the twelve apostles, and a native of Kerioth, Judæa. He was steward of the disciples, but was known to be avaricious and dishonest. For thirty

pieces of silver he betrayed Jesus into the hands of the Jews, and in a fit of horrible remorse, when his sin pressed heavily upon him, he committed suicide by hanging. The amount received for betraying Christ is commonly computed to have had a value of $22, but it had a relative value of fully $500.

JUDD, Orange, journalist, born near Niagara Falls, New York, July 26, 1822; died Dec. 27, 1892. He was educated at Wesleyan University, taught school three years, and in 1850 took up the study of agricultural chemistry at Yale. Six years later he became editor and publisher of the "American Agriculturist," served as agricultural editor of the "New York Times" in 1855-63, and was with the army of the Potomac as sanitary commissioner from 1863 to the end of the war. Subsequently he aided in building a railroad system in Long Island, and originated the "International Lesson-leaf." In 1857 he introduced sorghum cultivation from Europe, and about the same time gave the Orange Judd Hall of Natural Science to Wesleyan University. Reverses in business made it necessary to retire from the "American Agriculturist," but shortly after he founded the "Orange Judd Farmer" at Chicago.

JUDSON, Adoniram, celebrated missionary, born in Malden, Mass., Aug. 9, 1788; died April 12, 1850. In 1812 he was ordained by the Congregational Board of Foreign Missions as missionary to Burmah, and with three others—Newell, Nott, and Mills—began work about a year later among the Burmese. He translated the Bible into Burmese, which he completed in 1835, and in 1852 published his "Burmese and English Dictionary." His work was important from its widespread effect in bringing the natives to Christ, of which extensive evidences still remain. His activities were almost entirely under the Baptist Missionary Union, which he joined shortly after beginning work among the natives.

JUGGERNAUT (jŭg'gẽr-nạt). See **Jagannatha**.

JUGGLER, one who produces tricks by sleight-of-hand, or performs feats in legerdemain. The magicians of Egypt were skilled in apparent sleight-of-hand performances, and delighted to repeat wonders performed by Moses and others mentioned in ancient history. Tricks of different kinds have been performed by jugglers as matters of amusement or wonderment. Performers of this kind were common among the Romans and other ancient peoples, while the art is still practiced largely in all countries, but particularly at exhibitions and various entertainments.

JUGULAR (jū'gŭ-lẽr), the name of a large vein in the neck, through which the greater part of the blood that circulates in the neck, face, and head is returned to the heart. There are two of these veins, located on either side of the neck, one of which is near the skin and the other somewhat deeper. The external jugular returns blood from the face and neck, and the internal jugular from the brain and interior of the skull.

JUGURTHA (jū-gûr'tha), king of Numidia, son of Mastanabal, born in the early part of the 2d century B. C.; died in Rome in 104. He was carefully educated as a fellow student with Adherbal and Hiempsal, the two sons of Micipsa, who was the successor of Jugurtha's father. In 118 B. C. Jugurtha murdered Hiempsal, caused Adherbal to flee to Rome, and bribed the Roman senators to secure for him a more important portion of the kingdom than was allotted to Adherbal. In 112 he invaded the dominion of Adherbal, and, after capturing the town of Cirta, he captured and put to death both Adherbal and those associated with him in the government. These acts of cruelty caused the Romans to declare war against him, but he baffled his opponents for many years by bribing their generals, and was finally defeated by Metellus in 108 B. C. Sallust, the Roman historian, concludes the history of Jugurtha by reciting his delivery to Sulla, and his final death by starvation in a dungeon at Rome.

JULIAN (jūl'yạn), emperor of Rome, from his renunciation of Christianity called the Apostate, born in Constantinople, Nov. 17, 331 A. D.; died June 26, 363. He was the son of Julius Constantius, brother of Constantine the Great, and surnamed Flavius Claudius Julianus. His training was that of a Christian, and he studied letters and philosophy, but later embraced paganism while residing at Athens. He was summoned to Milan in 355, where he received the rank of Cæsar, and married Helena, daughter of the emperor. Soon after he was given general command of an army sent against the Germans, defeated them at Strasburg, and succeeded in forcing them to retreat beyond the Rhine. His administration in Gaul was successful, while his economical management made him popular with the various Frankish tribes. However, his growing popularity gave the emperor uneasiness, and in 360 the latter ordered a portion of his troops to proceed against the Persians. The soldiers protested against proceeding to the far East, and proclaimed Julian emperor, much against his own wishes. Soon after the emperor died and Julian became recognized as sovereign of the Roman world. About that time he proclaimed his disbelief in Christianity, permitted the restoration of heathen worship, but did not persecute either the Jews or Christians. He led an expedition against the Persians in 363, and began the rebuilding of the Jewish temple, but during a cavalry charge was wounded and died shortly after. Julian is the author of several works, the most important extant being "The Cæsars" and the "Misopogan," both treating of the emperors of Rome.

JULIUS, the name of three Roman popes,

who reigned between 337 and 151. The most notable of these is Julius II. He was born at Albisold Marina in 144; died Feb. 21, 1513. Julius II. occupied the papal throne from 1503 until his death. It is said of him, "he made his tiara a helmet and his cross a sword." See Pope.

JUNCTION CITY, county seat of Geary county, Kansas, situated between the Smoky Hill and Republican rivers. It is an important railroad junction and trade center. Among the manufactures are flour, farming machinery, ironware, and cigars. A military post is located at Fort Riley, which is about two miles from Junction City. Population, 1900, 4,695.

JUNGFRAU (yung'frow), meaning the maiden, a celebrated mountain of Switzerland, situated in the Bernese Alps, and elevated 13,670 feet above sea-level. The peak is beautified by the presence of great snow deposits. It was first ascended in 1811. A railway line passes to the summit from Lauterbrunnen.

JUNIPER (jū'nĭ-pĕr), a genus of hardy exogenous shrubs and trees belonging to the cypress sub-family of the cone-bearing

JUNIPER SHRUB. JUNIPER TREE.

group. There are twenty known species, all of which are evergreen, and abound chiefly in the temperate and cold regions of America, Eurasia, and Africa. The common juniper growing wild is generally a shrub from two to seven feet high, but in rare cases attains the height of twenty to thirty feet. In this genus the leaves are awl-shaped and the flowers whitish. The fruit is bluish-black, about the size of a currant, and requires two years to come to maturity. Within the fruit is a stone that yields oil of juniper, which constitutes a powerful diuretic, and the product of some varieties serves as a local irritant. The juniper tree found in Virginia is the red-cedar of North America. It bears bright-blue berries. Juniper trees often attain a height of from twenty-five to fifty feet. The wood is valuable for manufacturing lead pencils, cigar boxes, and cabinet products, and berries of many varieties are used in flavoring gin.

JUNIUS, a signature affixed to seventy letters which were published between January, 1769, and January, 1772, in the "Public Advertiser," in London, England. These letters became celebrated on account of the boldness with which various institutions, tendencies, and officials were attacked. Though the author never became known, public suspicion was fixed strongly on Burke and Viscount Sackville. The most characteristic statement made by Junius to George III. was: "Remember that while the crown was acquired by one revolution, it may be lost by another." Woodfull, editor of the "Public Advertiser," collected and published them in one volume, and was afterward prosecuted, but on some legal technicality escaped punishment.

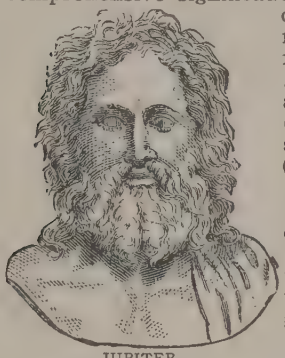
JUNK (jŭnk), a Chinese vessel used in navigating their seas, but which has also served for voyages extended to America and Europe. It is the largest of the Chinese vessels, and has no prominent stem or keel. The bow on deck is square, the stern full, and the rudder extends beneath the bottom of the vessel. The sails are usually of matting and stretched on large center masts.

JUNO (jū'nō), the Roman divinity identical with the Greek Hera, but differing from her in that Juno is revered and loved as a type of the matron and housewife. The Romans believed her to watch over and guard the life of every woman from her birth to her death, but she was worshiped mostly as the protectress of married women. A grand annual festival to her honor occurred on the first of March, called the Matronolia, and was accompanied with much solemnity. Two principal temples were dedicated to her in Rome—one on the Capitoline Hill and the other on the Aventine. She is described by Virgil as the wife of Jupiter in much the same relation that Homer represents Hera as the spouse of Zeus, each being jealous of her husband.

JUNOT (zhü-no'), **Andoche**, duke of Abrantes, marshal of France, born in Bussy-le-Grand, France, Oct. 23, 1771; died July 29, 1813. In 1792 he entered the army as a volunteer and became distinguished by energetic service in the wars of the republic. Having attracted the attention of Napoleon, he was engaged for service in the expedition to Egypt, and defeated 10,000 Turks at Nazareth. Later he served in the army of Portugal and succeeded in conquering the principal fortifications for France. These successes caused Napoleon to make him duke of Abrantes and governor of Portugal. Wellington defeated him at Vimieira, causing him to lose all advantages in Portugal, but he subsequently served in Germany, Spain, and Russia. The disaster at Moscow caused Napoleon to disgrace him on a charge of carelessness and sent him as governor to Illyria. These and other difficulties brought about a derangement of his mind, and he died from the wounds inflicted in an attempt to commit suicide.

JUPITER (jū'pĭ-tĕr), the principal Roman deity, corresponding to the Greek Zeus and

to the Sanskrit Dyaus. He was considered lord of life and death in the widest and most comprehensive signification, having power over both, in which respect he differs from the Greek Zeus, who was to a certain extent controlled by the sway of the Fates (q. v.). Zeus sometimes visited mankind under different disguises, but Jupiter always remained essentially the supreme god of heaven and never appeared upon earth. In statuary he is represented seated on a throne of ivory, holding a sheaf of thunderbolts in his right hand and a scepter in his left, while an eagle stands behind the throne. The most celebrated temple erected in his honor was that on Capitoline Hill, in Rome, which was built by Tarquin.



JUPITER.

JUPITER, the largest planet of the solar system, fifth in order of distance from the sun, being situated in space an average of 475,500,000 miles from that luminary. Its mean diameter is about 85,000 miles; polar diameter about 82,200; density about one-fourth that of the earth; bulk nearly 1,250 times that of the earth, and weight about 300 times as great as our planet. The orbit of Jupiter is inclined to the ecliptic at the angle of 1° 18′ 40″, and its period of revolution round the sun is eleven years, ten and one-third months. It is believed that the interior mass is intensely heated, which gives rise to light and dark belts. They are usually parallel to each other, but often merge into one another, and somewhat resemble the spots seen on the sun. In 1610 Galileo discovered the four satellites, or moons, of Jupiter. The principal characteristics of each is as follows:

SATELLITES OF JUPITER.

NAME.	MEAN DISTANCE FROM JUPITER.	DIAMETER, MILES.	DENSITY WATER AS 1.	SIDEREAL PERIOD.
				D. H. M.
I. Io	267,380	2,352	114	1 18 28
II. Europa	425,156	2,099	171	3 13 4
III. Ganymede	678,393	3,436	396	7 3 43
IV. Callisto	1,192,823	2,929	222	19 16 32

The satellites of Jupiter, like that of our planet, revolve once upon their axis while making one complete revolution round the planet. They are eclipsed in the shadow of Jupiter and also by their own shadows, and appear to move in lines nearly parallel from one side of the planet, thus evidently having orbits similar to the orbit of Jupiter, but within the plane of the ecliptic of that planet. In 1706 the Danish astronomer, Olaus Römer (1644-1710), carefully observed the eclipses of Jupiter's satellites and discovered the progressive movement of light. Prior to his time light was considered instantaneous, but he became convinced that it requires sixteen and one-half minutes to travel the orbit of the earth, which has since been verified by the phenomena of the aberration of light, and the velocity has been fixed at 186,000 miles per second.

JURA (jŭ′rä), an important mountain chain that trends northeast and southwest for a distance of about 425 miles, and forms the principal boundary between France and Switzerland. It is so named from the Jurassic limestone which constitutes the principal geological formation, though this is alternated with sands belonging to the lower cretaceous series. Several gorges cross the mountain range, and it is otherwise characterized by stalactite caves in which the bones of extinct animals are numerous. The Ain and Doubs rivers rise in the western slopes and form tributaries of the Rhone. Among the highest peaks are Crêt de la Neige, elevation 5,650 feet; Reculet, 5,648 feet, and Mont Tendre, 5,520 feet.

JURASSIC (jū-răs′sĭk), the name applied to geological formations that abound in the Jura Mountains and in various portions of America. These formations correspond to those designated as Lias and Oölite.

JURUA (zhōō-rōō′ä), an important river of Brazil, rises in the Andes of western Peru, flows toward the northeast, and joins the Amazon some distance above Fonteboa. Its entire length is 1,100 miles, of which about 560 miles are navigable. The valley of the Jurua is timbered heavily and yields large quantities of rubber.

JURY, a body of men selected under legal provisions, impaneled, and sworn to investigate questions of fact, and to return a true verdict or decision according to evidence legally placed before them. Three kinds of juries are recognized in courts of justice; grand juries, petit juries, and special juries. Grand juries generally consist of less than twenty-four men and more than eleven, who are summoned by the county sheriff and duly impaneled for service, though in some states the jurors to serve are limited to five or seven, these being selected by lot from the whole number summoned, and those remaining are excused. After administering the necessary oath, the presiding judge instructs them in their duty, when they repair to a closed room and select a foreman from their number. Their duties include the consideration of various accusations brought before them by the county attorney, or others, and if they agree by unanimous vote that certain charges against individuals are based upon truth and are of indictable character, they return a true bill or indict-

ment, which forms the basis of subsequent prosecution in the court of record; otherwise the accusations are dismissed for want of sufficient foundation. Grand juries hear only one side of criminal procedures. They are relics of the star-chamber abolished by the Magna Charta exacted by the people of England from King John in 1215. Some citizens oppose them as unnecessary institutions, and they have been abolished in a number of the states.

Petit juries and special juries consist usually of twelve men, are appointed both in civil and criminal cases, and the verdict given must be unanimous. In the lower courts and in some special cases, juries consist of a smaller number of men, usually six. The panel for juries in courts of record includes generally twenty-four men, of which twelve are selected by parol, though those chosen in this way may be excused peremptorily or for cause. After this they are sworn; hear the evidence in the cause; listen to the plea of the attorneys; are instructed by the judge in relation to points of law, and retire for the purpose of agreeing upon a verdict, no intermission being granted for sleep or recreation. The jury reports in civil cases to the judge by sealed verdict at the session of court immediately following an agreement, and before being discharged from service. However, if they cannot reach an agreement, they are discharged from service and a new jury may be impaneled to try the same cause at the same or a subsequent session of the court, though causes of a criminal nature cannot be taken up for trial a second time in case the accused is found not guilty. In cases of death by accident or violence, a coroner's jury is summoned for the purpose of determining the cause from which death resulted. The presiding officer of a coroner's jury is the county coroner or an officer corresponding to the justice of the peace, and the investigation is made at the place where death occurred and in the presence of the body, and, in some cases, a corpse may be exhumed for that purpose. The person or persons held guilty by a coroner's jury are subject to indictment by the grand jury, and triable by the petit jury.

JUSTINIAN I., surnamed The Great, emperor of Byzantium, born in the village of Tauresium, Illyria, about 483 A. D.; died Nov. 14, 565. He was the nephew of Emperor Justin, was born a slave, secured a good education at Constantinople, and received a share in the prosperity of his uncle. In 521 he was chosen consul. He was made co-emperor in the government with Justin in 527, and at the death of the latter was proclaimed emperor. Owing to a wise selection of generals, his reign of thirty eight years became the most successful in the later history of the Roman people. The generals chosen by him included Belisarius, who in 523 and 529 defeated the Persians and attained victory in Africa; and Narses, who overthrew the Ostrogoth's supremacy, thereby widening the Roman dominions to about the same extent as the limits during previous prosperity. Besides being a wise ruler, Justinian ranks as a great law-giver. He commissioned ten learned civilians to codify the imperial statutes. These, however, did not contain all the laws, since the greater part of the Roman law was included in the writings of commentators and jurists. Under the direction of Tribonian a commission prepared a single treatise that embodied all the common law, which was published after four years of labor as the "Digest," and appeared in fifty volumes. Tribonian also published a law treatise which served as a text-book for students, and is known as "Justinian's Institutes." Likewise Justinian's attention was turned to the building of cities, fortresses, and churches, and he rebuilt the celebrated St. Sophia Church at Constantinople. His intentions were both just and upright, but the extensive movements favorable to progress and improvement greatly burdened the people with taxes, and his successors were not rulers capable of carrying forward the vast enterprises for which his reign is noted.

JUTE (jūt), the fiber of two Indian plants, both belonging to the lime-tree order, and cultivated extensively in Bengal and adjacent territories. The plants are annuals, have yellow flowers, and attain a height of from five to fifteen feet. The fiber forms the inner bark, and is separated from the outer by steeping in water for several days. It is of fine texture, possesses a shining surface, and the injury that accrues when exposed to water renders it illy adapted for canvas and cordage. However, it is used profitably for carpets, gunny-bags, and in a mixture with hemp for cordage and mats, and paper is made from the smaller fragments and cuttings. Though cultivated and used in manufactures in India for many centuries, jute did not come largely into use in the United States until 1830, and within recent years the plant has been naturalized and is grown successfully in the southern states. Gunny-bags are employed largely in transporting cotton, rice, pepper, coffee, and other articles of commerce from Asiatic ports, while the raw material is transported to the manufactories of America and Europe. The annual importation of jute to the United States is valued at $3,500,000, while the total consumption of the world is about 550,500 tons.

JUTLAND (jŭt'land), in Danish Jylland, an important peninsula of Europe, located north of Germany. On the east, north, and west it is bounded by the Cattegat, Skager Rack, and the North Sea. It forms the principal portion of Denmark, has an area of 9,755 square miles, and a population of 965,125. The inhabitants have preserved

the customs and language of the ancient Jutes, who were a powerful people of northern Europe in the 5th century, and with the Angles and Saxons conquered and settled portions of Britain. Aalborg and Aarhus are the principal seaports.

JUVENAL (jū'vē-năl), Roman satirical poet, born in Aquinum, in Bolcian, about 55 A. D. His father, a Roman citizen, resided at Aquinum on an estate, and Juvenal was sent to be educated at Rome, where he formed the friendship of Quintilian and Martial. Little is known of his history, but it is certain that he served as a tribune in the army of Domitian about 81 A. D., and became censor of his native town. He traveled extensively in Europe and western Asia, and visited Upper Egypt. Later he became distinguished for his numerous writings, of which fifteen satires are extant. These productions, besides possessing literary value, furnish excellent pictures of Roman life and customs. They are forceful in language, and give clear exhibits of the social corruption among the Romans, which is expressed by an indignation and heartfelt solicitude. The tenth of the satires is known as "The Vanity of Human Wishes," and is considered the most explicit and popular of these writings. Several works of Juvenal were translated by Samuel Johnson, and translations were made also by Dryden and Gifford. The satire used by Juvenal was employed for the purpose of exposing the crimes, tyranny, and follies, and not, like those of Horace, as a branch of popular comedy.

K

K, the eleventh letter and eighth consonant of the English alphabet. It has a guttural articulation before all consonants and vowels, except before n, where it is silent, as in knell, knife, and knit. From the 16th to the 18th centuries it was written after c at the end of a word for the purpose of strengthening the hard c, as in publick, musick, and almanack. In the French the letter k is used only in a few Greek derivatives, and in the Italian, Spanish, and Portuguese it has gone out of use. In German some words are written either with c or k, as Carl or Karl, Cöln or Köln.

KAABA (kȧ-ā′bȧ), an oblong stone structure in the great mosque of Mecca, which constitutes the sacred shrine to which Moslems make their pilgrimages for religious worship. According to legendry, it is located on the spot where Adam offered his first worship after being expelled from the Garden of Eden. Some writers assert that a tent was sent from heaven in which the worship took place, but others hold that Adam built a structure of stone and clay, which was destroyed by the deluge, but was afterward rebuilt by Abraham and Ishmael. The structure is forty-five feet wide, fifty-five long, and about forty high. It occupies a place in the sacred area of the mosque, which is surrounded by a wall and colonnades. The black-stone or Keblah is at the southeast corner of the Kaaba, where it is held by masonry, and toward it every pious Moslem directs his face when praying. To kiss the Kaaba is the supreme object of every pilgrim.

KABUL (kä′bul), or **Cabul**, the capital city of Afghanistan since 1774, when it was made such by Timour. It is situated in a province of the same name, at the junction of the Loghar and Kabul rivers, on a productive plain southwest of the Hindu-Kush Mountains, at an altitude of 6,375 feet above the sea. The walls of former times are largely in ruins. Its trade with Central Asia is important, while its extensive bazaars are noted for their excellent carpets and large variety of fruits. Besides several government buildings, it contains a Jewish synagogue, several mosques, and numerous manufactures of textiles. Kabul was captured by the British in 1842 and 1880, while within recent years it has been influenced more or less by the advances of Russia. The inhabitants include Afghans, Hindus, and Jews. There is a considerable trade in live-stock, fruits, and jewelry. Population, 65,500.

KADESH BARNEA (kā′desh bär′ne-ȧ), a city mentioned in the Scriptures as the place of encampment of the Israelites as they journeyed on their exodus from Egypt. It was the death place of Miriam, sister of Moses, and also became celebrated on account of Moses and Aaron offending the Lord by doubting that water would flow from the rock when struck before the people with a rod, as he had promised. For this sin Moses and Aaron were punished by being forbidden entrance into the promised land.

KADIAK (kȧd-yȧk′), an island immediately south of the Alaska peninsula. It is about one hundred miles long, sixty miles wide, and contains an area of 5,100 square miles. Much of the surface is rugged; numerous inlets characterize the coast. Its climate is made disagreeable by dense fogs and frequent rains. The principal industries are fishing, canning, and furring. The salmon canning industry employs 1,250 hands, and is supplied wholly from fish taken from the Karluk River. St. Paul is the principal town, and from it are shipped annually furs valued at $300,000.

KAFIR (kä′fẽr), an Arabic word meaning unbeliever, and now the common name of the most important native race of southeastern Africa, a branch of the Bantu family. The region occupied extends with more or less variation from Delagoa Bay to Cape Colony. The head of the Kafir is shaped more like that of Europeans than Negroes; nose high, hair frizzled, and complexion brown, with lighter variations in those found in the southern districts. Their habits are frugal and simple, the race generally tall and muscular, and the occupations pursued chiefly are hunting and cattle raising. The women engage to some extent in the cultivation of cereals, vegetables, and fruits. There are several distinct branches of Kafirs; those best known are the Swazi, Pondos, Fingoes, and Zulus. The last named tribe is especially numerous in the British colonies of Natal and Cape Colony, and has shown marked improvement under the influence of missionaries and teachers. As a rule the Kafirs are deficient in sentiments of religion, and manifest marked superstition and a strong credence in witchcraft. The first accounts of them were published in 1617, when they came in contact with the Dutch colonists, who began to make settlements near the Cape of Good Hope. After 1688 they are mentioned frequently in the colonial records kept by the Dutch. After settling in Cape Colony, the British began to press them and claim their lands, which resulted in several wars, notably those in 1811-12, and at numerous times since. The war of 1846 led to the reservation of a district known as Kaffraria, which in 1853 was

made a crown colony. Originally they occupied territory including 1,000,000 square miles, but with the general occupation of Africa by European powers they have been largely localized and their habits of living modified. The total number at present is about 3,000,000. See **Zulus**.

KAFIRISTAN (kä-fē-rēs-tän′), a name meaning "the country of infidels" and applied to a region northeast of Afghanistan. It is situated between the Hindu-Kush Mountains and India. The country is largely mountainous and inhabited by the Siaposh, a native race consisting of tribes that vary in complexion, and who engage chiefly in agriculture, fruit growing, and cattle raising. The entire area is about 5,000 square miles, while the inhabitants number 200,450. They have become distinguished for their love of independence and their strenuous resistance to the Mohammedan faith. Their dress is mostly of goat-skins and fabrics woven from the hair of goats, and the prevailing color is black.

KAGOSHIMA (kä-gō-shē′mä), a city of Japan, situated on the Kagoshima River, at the southern end of the island of Kiushiu. It is an important seaport, contains a college, and has a large trade. There are manufactures of earthenware, clothing, silks, and machinery. Population, 57,640.

KAILAS (kī-läs′), an elevated mountain peak of the Himalayas, situated near the Sutlej and Indus rivers; height, 20,230 feet above sea-level. It is celebrated as a sacred mountain of the Hindus. The slopes are covered with fine forests of deciduous and evergreen trees.

KAISER (kī′-zẹr), a word derived from the Latin term Cæsar, and applied as the official title of the emperor of Germany. The title was originated from certain provinces near the Danube formed by Diocletian, and though anciently assigned to a Cæsar, they became a part of the German Empire in 1438. When William III. of Prussia was proclaimed emperor of Germany at the conclusion of the Franco-German War in 1871, the ancient title of the German emperor was revived.

KALAMAZOO (kăl-ạ-mạ-zo͞o′), an important city in Michigan, county seat of Kalamazoo county, about forty miles from Lake Michigan. The city is the focus of numerous railroad lines, giving it extensive connections with other trade emporiums. It is the seat of an excellent public school system, and has numerous churches, electric street railways, public parks, a state normal school, and the asylum for the insane. Among the industries are flouring mills, iron foundries, and factories for the production of wind-mills, plows, vehicles, machinery, sleds, cigars, and furniture. The public library contains a well selected collection of reading matter. Its musical academies and art galleries are centers of much interest. The Kalamazoo River, on which it is situated, flows into Lake Michigan. It has a total length of 200 miles, twenty-miles of which are navigable. Population, 1904, 29,782.

KALEIDOSCOPE (kä-lī′dō-skōp), an optical instrument which produces an endless variety of symmetrical and beautifully colored designs, invented in 1817 by David Brewster. It is made of a tube with two plane mirrors, usually formed of slips of glass from six to twelve inches in length, darkened at the back, and diminishing in width from about three inches at one end to one inch at the other. Some varieties are made rectangular, but the trapezoidal form is the most common. The mirrors are adjusted so their reflecting surfaces face each other and form any angle of which 360 is a multiple, the usual angle being 60°. The conical tube is made of paper, tin, or brass; a trifle larger than the mirrors, and of sufficient diameter at its wider end to inclose their points. A metal plate containing a small hole at the center closes one end of the tube, to which the eye is applied. The opposite end contains two plates, the one next the eye of clear glass, and the other ground, between which a number of beads or small pieces of colored glass are placed so they may move freely. When applied to the aperture, the eye sees beautiful symmetrical figures produced by the mirrors, and these are greatly diversified whenever the tube is shaken or turned. It has been a favorite toy from its invention, but also serves a useful purpose for illustrating the optical problem of the multiplication of images produced by reflection. It is used by designers to secure patterns for calico, carpets, and wall papers.

KALMUCKS (kăl′mŭks), or **Calmucks**, a people of the Mongolian race. In character they are warlike and nomadic, engage largely in agriculture and stock raising, and are native to the Chinese Empire and various parts of Russia. They are colonized in large settlements on the Volga, Ural, and Don rivers. In stature they are of middle height, possess considerable strength, and are marked by prominent cheek bones, short chin, thin beard, and shaggy hair. Their religion is Lamaism; the language is allied closely to the Mongolian proper, and is written with a similar alphabet and grammatical construction. The total number includes about 700,000, of which one-half reside in China, about 125,000 in Russia, and the remainder in Central Asia. They have conducted numerous wars against the Tartars, Chinese, and the Russians. Those in Europe have been converted largely to the Greek Church by Russian missionaries.

KAMA (kä′-mä), an important river of Russia, the largest branch of the Volga. Its source is in the province of Viatka. It makes a bold turn through Perm, and flows into the Volga in the province of Kazan, about forty miles below the city of Kazan.

The Kama forms the principal highway of commerce between St. Petersburg and Siberia, is free from ice about eight months of the year, and has been improved by several canals. The total length is 1,300 miles, and it is navigable for about 850 miles. A canal connects it with the Dwina, thus uniting the White and Caspian seas.

KAMCHATKA (käm-chät'ka), or **Kamtchatka**, an important peninsula extending from northeast to southwest in the northeastern part of Asia. It is bounded on the east by Bering Sea, south by the Pacific, and west by the Sea of Okhotsk, and includes an area of 140,000 square miles. The climate is cold, though vegetation during the warmer parts of the year is remarkably luxuriant. The Kamchatka is the most important river, having a length of 110 miles, and flows northward through the most fertile and populous portion of the peninsula. Among the minerals are iron, copper, mica, lignite, and sulphur, which are mined largely under Russian supervision, though the principal products include furs and fish. There are many fur-bearing animals, including the beaver, bear, sable, and Arctic fox. Since 1706 it has been a possession of Russia. It is governed from the local capital, Petropaulovsk, a town of 1,200 population. The total population of the peninsula is 7,250.

KAMEHAMEHA (kä-meh-hä'meh-hä), the name of five kings of the Sandwich islands, who ruled successively from 1811 to 1872 over a kingdom maintained there, except only the years between 1824-33, when the government was under the regency of two queens of Kamehameha II.—Kamehameha I., the first of these rulers, was aided by several European vessels in subjugating the whole group, which was effected in 1809. He introduced a number of civil arts by employing European mechanics.—Kamehameha II. was the son of the preceding king. He abolished idol worship on ascending the throne in 1819, and secured the services of missionaries from Boston to teach his people the rudiments of reading and arithmetic. In 1824 he and his queen visited London, where both died of measles.—Kamehameha III., brother of the preceding, ascended the throne when nineteen years of age, in 1833. He was educated by American missionaries, granted the people a written constitution and code of laws in 1848, and exercised considerable influence for education and civilization. The United States recognized the independence of the Hawaiian kingdom in 1842, and France and England did likewise the year following. On Dec. 15, 1854, he died childless in Honolulu, aged forty years. —Kamehameha IV., nephew of the preceding, was born in Hawaii, Feb. 9, 1834; died Nov. 30, 1863. His education was secured under American missionaries. After visiting in the United States, England, and France, he succeeded to the throne in 1854. —Kamehameha V., eldest brother of the preceding, was born Dec. 11, 1830; died Dec. 11, 1872. He held the position of minister of the interior and commander-in-chief of the army during his brother's reign, and succeeded to the throne in 1863. He opposed the constitution, thinking it too democratic for the common weal, and called a convention to form a new one, but dissolved it himself, and prepared a constitution less democratic than the one formerly in force. While fearless, strong-minded, and firm, he was suspicious of the people and avaricious in his government. He left no heir to the throne, and the dynasty ended with his reign.

KANAZAWA (kä-nä-zä'wä), an important city of Japan, situated near the northeastern coast of the island of Nippon. It contains numerous public institutions, several famous temples, and ruins of old fortifications. Its manufactures include porcelain, silk, toys, and paper. There are railroad connections, waterworks, several parks, and a large trade. Population, 97,640.

KANDAHAR (kän-dä-här'), one of the principal cities of Afghanistan, situated 250 miles southwest of Kabul, at an elevation of 3,400 feet. Its location on a general route to India makes it an important commercial and strategical center, which fact has induced the government to fortify it with strong works. A wall with a thickness of from ten to sixteen feet, height twenty-five feet, and a length of four miles has been built around it. There is also a strong fortress two miles north on a precipitous rock, which has proven of much utility against the attacks of invaders. It is thought that Alexander the Great founded the city, though it appears to be entirely of Persian origin. Few modern conveniences have been introduced. Excellent bazaars are maintained by numerous Persian and Hindu merchants, and it contains the tomb of Ahmed Shah. There are manufactures of earthenware, clothing, jewelry, shawls, and utensils. Population, 60,100.

KANE, Elisha Kent, Arctic explorer and scientist, born in Philadelphia, Penn., Feb. 3, 1820; died in Havana, Cuba, Feb. 6, 1857. He graduated from the University of Pennsylvania in 1842, when he received a doctor's degree, and the next year entered the United States navy as a surgeon. In that capacity he served on the Brandywine, which carried Webster as United States minister to China, and while on the trip to the East he visited numerous countries of Eurasia. He returned to America in 1846, but soon after sailed under government orders to Africa. In 1850 he served as surveyor of the Gulf of Mexico for the United States government, and joined the Grinnell expedition the same year for the purpose of making a search for Sir John Franklin. He was led to believe by observations made while on

this tour that there is an open sea in the vicinity of the north pole, and, for the purpose of testing this belief, he organized an expedition and sailed in May, 1853, from New York in the Advance. On reaching 87° 43′ north latitude the ship was frozen in the sea of ice for twenty-one months and after many hardships and privations the vessel was abandoned. After traveling in boats and sledges a distance of 1,300 miles, he reached Greenland, and in November, 1855, returned to New York. Being much impaired in health, he sailed on a recruiting tour to Cuba, where he died. Knowledge of the Arctic regions was greatly extended by accounts of Kane's two expeditions, and he was awarded a gold medal by congress. His publications include "Narrative of the Expedition in Search of Sir John Franklin" and "Second Grinnell Expedition in Search of Sir John Franklin."

ELISHA K. KANE.

KANGAROO (kăn-gȧ-rōō), a species of herbivorous quadruped native to Australia, Tasmania, and New Guinea, and first made known to Europeans by Captain Cook in 1770. They are distinguished by long hind legs, small fore legs, huge tail, small, deer-like head, and large ears. When standing erect, they are about the height of a man, spring from ten to fifteen feet by means of the hind legs and tail, and are able to resist an attack with much skill and fury, though they have a timid disposition and are easily domesticated. The principal food is grass and other vegetable forms. Owing to the consumption of large areas of grass by herds of kangaroos, they have been hunted for destruction, but also for their skins, which are valuable in the manufacture of gloves and shoes. A peculiar pouch or marsupium is attached to the lower part of the body, in which the nipple of the mammary glands open and serve for the protection of the immaturely-born young for a period of about eight months. The flesh of these animals is prized for food, resembling venison, while the tail is a favorite article for soup. There are many species of kangaroos; the variety particularly described in this article is the great kangaroo, while others are known as the red kangaroo, brush kangaroo, and agile kangaroo. The kangaroo-rat and kangaroo-bear are also marsupials found in Australia and New South Wales. An apple known by the same name is an edible fruit found in Australasia and South America.

GREAT KANGAROO.

KANGAROO ISLAND, an island at the entrance of St. Vincent Gulf, south Australia, about 102 miles from Adelaide. It is largely barren and is valuable mainly for its fisheries. The area is 1,675 square miles.

KANKAKEE (kăn-kȧ-kē′), a city in Illinois, county seat of Kankakee county, on the Kankakee River, which supplies an abundance of water power. The Kankakee River rises in St. Joseph county, Indiana, and after a course of 225 miles joins the Des Plaines River. There are important railroad connections, fine public schools, and many churches. It is the seat of the Eastern Illinois Hospital for the Insane. The surrounding country is agricultural and fruit-growing and has valuable deposits of limestone. Among the manufactures are clothing, flour, ironware, nails, machinery, and cigars. There are street railways, electric lights, pavements, and fine county buildings. Population, 1900, 13,595.

KANSAS (kăn′sȧs), a central state of the United States, situated in the geographical center of the Union. It is bounded on the north by Nebraska, east by Missouri, south by Indian Territory and Oklahoma, and west by Colorado. Its shape is rectangular; has a width of about 210 miles from north to south, a length of 400 miles, and contains an area of 82,080 square miles, about as large as Maine, Pennsylvania, and Delaware. The state consists largely of undulating plains that slope towards the southeast, and is drained by the Kansas River into the Missouri, and the Arkansas into the Mississippi. Other streams include the Cimarron, Neosho, Smoky Hill, Solomon, Republican, and Big Blue rivers. None of the rivers is navigable, except the Missouri, which forms the northeast boundary. The eastern part of the state possesses a highly fertile soil, and is remarkably productive in cereals, vegetables, and fruits, while the western portion is best adapted to stock raising. Belts of timber abound along the streams and water-courses, but are most extensive in the eastern portion. The climate is agreeable and marked by dry and mild winters, while the summers are tempered by breezes, and the nights refreshing and cool. Owing to limited rainfall in the extreme west, that portion is not so favorable to cultivation as the other parts of the state, though the soil contains marked elements of fertility. Rainfalls are most abundant from April to July, the annual

average in the eastern part being thirty-three inches. The mean annual temperature of the state is 50° Fahr.

A large portion of Kansas was formerly covered with the so-called buffalo grass, but this prevails at present only in the western portion, while the valleys are covered with an excellent and abundant growth of bluestem and other bladed grasses valuable for hay and pasture. Corn is the principal agricultural product, of which the average annual yield is about 185,500,000 bushels. The state has long held a position as one of the principal corn-producing states, usually taking fourth or fifth rank. The leading cereals are corn, wheat, barley, and oats, but there is also a considerable yield of rye, flax, and vegetables. There are large interests in the production of hay, cattle, swine, horses, mules, and sheep. The timber products include hickory, cottonwood, boxwood, oak, basswood, sycamore, and willow. The pure atmosphere and fine qualities of the soil have caused a general enlargement of horticultural products, which include the peach, plum, apple, pear, cherry, and grape. Sugar-cane and sugar-beets are cultivated largely for the production of sorghum and sugar; dairy butter and cheese making are important industries, while the production of tobacco is receiving marked attention.

As a mining state, Kansas takes high rank in the production of ocher, zinc, lead, and bituminous coal, while gas and mineral oils abound in large and paying quantities in the southeastern part. The most important gas deposits are in the vicinity of Iola, where divers manufacturing establishments have been built to utilize practically this valuable commodity. Other productions rapidly developing are those of salt, red and yellow ochre, and stone for construction and monuments. Besides the manufactures connected with stock raising and agriculture, there are extensive interests in the production of flour, machinery, agricultural implements, stoves, cigars, earthenware, clothing, and sugar. Kansas is divided into 105 counties, practically all of which may be reached by one or more railroad lines; those not having railroads are conveniently situated and are accessible from centers of commerce by good highways. The total railroad lines is placed at 9,500 miles, or more than sufficient to pass one-third the distance round the earth.

Educationally Kansas holds an enviable place among the states, and has a very small percentage of illiteracy. It contains the highest proportion of American-born citizens of any state, and maintains and liberally supports an excellent system of public education. Common schools are situated at convenient distances from the homes of those residing in the country, while high schools with adequate courses of study are located in all the towns, cities, and in some of the rural districts. The courses of study pursued in the schools articulate with the colleges and different higher state institutions. The state university is located at Lawrence, a normal school at Emporia, and an agricultural college at Manhattan. Among other excellent colleges are Washburn University at Topeka; Highland University, Highland; Ottawa University, Ottawa; St. Benedict's College, Atchison; St. Mary's, St. Mary's; Lane University, Lecompton; Baker University, Baldwin City, and Bethany College, Bethany. Several charitable, penal, and correctional institutions are maintained by liberal appropriations. The state penitentiary is located at Lansing; the Institution for Feeble-Minded Children, Winfield; the Institution for the Deaf and Dumb, Olathe; the Institution for the Blind, Kansas City; the Soldiers' Orphans' Home, Atchison; a state insane asylum, Topeka; another state insane asylum, Osawatamie; the State Soldiers' Home, Atchison; the Industrial School for Girls, Beloit; the Reform School for Boys, Topeka, and the State Industrial Reformatory, Hutchinson. There are 15,000 teachers in the public schools, and the training for this profession has been well guarded in that normal instruction is given at twelve high schools and nine colleges. Many of the schools and cities contain excellent libraries and support scientific societies. About 800 periodicals are published in the state, of which sixty are dailies, 650 weeklies, fifty-eight monthlies, and the others issued at more or less frequent intervals. The periodicals are devoted to the numerous interests of society, the professions, and the industries.

The larger part of Kansas constituted a portion of the Louisiana Purchase acquired from France in 1803, but the region lying south of the Arkansas River and west of longitude 100° W. was ceded in 1850 by Texas to the United States. It was first visited in 1541 by Coronado, a Spaniard, and was partly explored in 1819-20 by Major Long of the United States army. The region was a part of Missouri territory till 1821, and then remained unorganized till the Kansas-Nebraska bill, in 1854, formed the territory of Kansas, which also included part of the present state of Colorado. After much controversy between opposing parties to make Kansas a free or a slave state, it was admitted to the Union on Jan. 29, 1861, under the Wyandotte constitution, prohibiting slavery. Prior to its admission occurred the celebrated border war, resulting from an attempt of people from the northern and southern states to influence its final position as to slavery. It is popularly called the Sunflower State. Topeka is the capital. Other important cities include Kansas City, Leavenworth, Wichita, Atchison, Pittsburg, Ft. Scott, Lawrence, Hutchinson, and Emporia. Population, 1900, 1,470,495. Of this number, 54,176, or 3.7 per cent., are colored inhabitants, including 52,003 Negroes and 2,130 Indians. There is an excess of

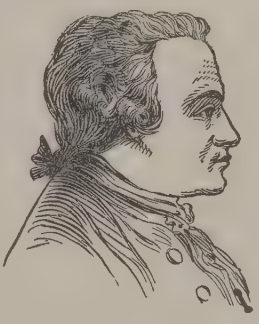
males over females, the per cent. of males being 52.3.

KANSAS, a river of Kansas, formed in Dickinson county by the union of Solomon and Smoky Hill rivers. After an easterly course of 200 miles, it joins the Missouri at Kansas City. The valley of the Kansas River is highly fertile, producing large quantities of fruits and cereals.

KANSAS CITY, the largest city in Kansas, county seat of Wyandotte county, and separated from Kansas City, Missouri, by the state boundary. It was incorporated as a city in 1886, when it was formed of Armstrong, Wyandotte, Armourdale, and several other suburban villages. It is situated at the confluence of the Kansas and Missouri rivers, giving it excellent transportation by river navigation. The city is the focus of numerous railroads. and is connected with Kansas City, Missouri, by electric street car lines. Its live-stock business ranks as the second largest in the world. It is one of the largest packing-house centers in the United States, and those located in this part of the city have given a world-wide reputation to the two cities. The live-stock received annually aggregates 3,250,000 head, of which sixty-five per cent. are hogs, twenty-seven per cent. cattle, and six per cent. sheep. Of this vast number about sixty-five per cent. are disposed of at the packing houses. It is also the seat of large grain elevators and numerous manufacturing enterprises. The aggregate capital invested in manufactures is $12,000,000; the product valued at $47,500,000, and the number of persons employed 7,800. The city has substantial pavements, waterworks, gas and electric lights, excellent churches, and contains numerous educational institutions. Population, 1880, 3,200; 1890, 38,316; 1900, 51,418.

KANSAS CITY, the second city in population in Missouri, situated in Jackson county, on the south bank of the Missouri, and separated by the state boundary from Kansas City, Kansas. In 1854 it was known as Westport Landing, and owes its early growth to the navigation facilities of the Missouri River, by which it was built up considerably before the construction of railroads. At present it is one of the most important railroad centers in the west, has a wholesale trade of great magnitude, and a large business in handling cereals and other farm produce. Its manufactures represent a capital of $17,500,000, producing annually $50,000,000 worth of commodities, and employing 16,500 persons. The manufactories and other facilities and interests of its neighboring city across the line are not included in these estimates. The site of the city is made up largely of high bluffs, though the larger volume of business is along the river valley. Among its public buildings are schools of dentistry, medicine, and pharmacy, hospitals, and charitable institutions. There are excellent public and private institutions of general learning. Its railroad depot is one of the finest in the west. A bridge 1,390 feet long spans the Missouri River, and numerous others cross the Kansas River. The city has several excellent libraries and numerous public parks, and is equipped with all modern facilities. Population, 1900, 163,752.

KANT (kănt), **Immanuel**, educator and metaphysician, born in Königsberg, Germany, April 22, 1724; died there Feb. 12, 1804. He was the son of a saddler and strap maker, graduated at the university of his native town, where he took a degree in 1755, and entered upon the profession of a teacher. In 1770 he was elected professor of logic and metaphysics at the University of Königsberg, and later also taught natural theology, moral philosophy, physical geography, and natural law. Like Socrates, he was fond of reading, but seldom left his native town more than forty miles. He never married, and was regarded of unimpeachable honor and veracity. As a teacher, he held that pupils should be induced to form the habit of self-reflection for the purpose of enlarging mental power. The germ of his theory lies in the proposition that before any knowledge can be developed concerning the object of cognition, the student must acquire the faculty of cognition and clearly realize the sources of knowledge it contains. He held that sense, understanding, and reason are the three original faculties by which we acquire knowledge. He regarded sense a passive and receptive faculty for the reason that it necessarily depends upon space and time; understanding, or the active faculty, consisting in the power of forming conceptions by categories, such as causality, unity, and plurality, these categories being applied to objects of experience through the medium of the two forms of perception, space and time. Reason is the power of forming ideas and constitutes the higher degree of mental spontaneity. In teaching and lecturing it was his habit to fix his eye upon one or two students, and by their attitude determine whether or not his instruction was assimilated and understood. In morality he was austere and stoical, and maintained the unconditional validity of the moral law. Duty and obligation he considered the supreme governing idea in religion, and left but little play for the inclination and feelings of the individual. His writings and lectures cover a wide range of subjects, and collectively constitute an important



IMMANUEL KANT.

series of productions. His works on pedagogy are of especial interest, and have given tone and tendency to systems of education in many countries. The most important of his writings include "Treatise of the Practical Reason;" "Criticism of the Pure Reason;" "Foundation of Metaphysics and Ethics;" "Treatise of the Power of Judgment;" "Observations Regarding Feelings of Beauty and Order;" "Metaphysical Elements of Science," and "Anthropology in a Pragmatic Point of View."

KARAMZIN (kä-räm-zeen'), **Nicholas Michaelovitch**, historian and poet, born in Mikhailovka, in the government of Orenburg, Russia, Dec. 12, 1765; died June 3, 1826. He was the son of an officer in the army and was designed for a military career, but his aptness and preference for literary work caused him to go for study to Moscow. In 1789 he traveled extensively in Switzerland, Germany, France, and England. His experience in these travels was published under the title, "Letters of a Russian Traveler," and met with enthusiastic reception. In 1802-3 he edited the "European Messenger," and shortly after begun his great "History of the Russian Empire." To accomplish this work he secluded himself for several years, and in 1816 removed to St. Petersburg, where he was favored by Alexander, and the two together read the parts in the palace gardens. He completed eleven volumes, his work terminating with the accession of Michael Romanoff (1596-1645), the founder of the reigning dynasty of Russia, who ascended the throne in 1613.

KASKASKIA (kăs-kăs'kĭ-ą), a river in Illinois, rises in Champaign county, flows southeast and enters the Mississippi at Chester. It has a length of 200 miles and is navigable for about fifty miles. The first settlement in the state was founded by the French on the Kaskaskia River, about seven miles from its mouth, in 1680. Kaskaskia was the first capital of Illinois. It is now a small post village. Population, 1900, 177.

KATAHDIN (ką-tä'dĭn), a celebrated mountain peak, the most elevated in Maine. It is situated in the central part of the state about eighty miles west of Bangor; height, 5,385 feet above sea-level.

KATTEGAT. See **Cattegat.**

KATYDID (kā'tŷ-dĭd), a pale-green insect about an inch and a half long, allied to the grasshopper. There are several widely distributed species. The name is an imitation of their peculiar note heard at night, which is caused by the friction of membranes attached to the covers of the wings. It is made only by the males, being a call to the noiseless females.

KAUFFMAN (kowf'män), **Angelica**, German artist and singer, born in Schwartzenberg, near Bregenz, in Tyrol, Oct. 30, 1741; died Nov. 5, 1807. Her early disposition to execute portraits caused her father to take her to Milan, where she studied the great masters. Later she visited various parts of Italy, and studied at Rome, Venice, and Bologna. In 1765 she accompanied Lady Wentworth to London, and there secured a reputation as a painter of portraits and historic pictures. She married the Italian painter, Zucchi, in 1781, and returned to Rome, where she produced many excellent works of art. As a singer she took high rank and appeared in the society of nobles.

KAUKAUNA (ką-ką'ną), a city of Wisconsin, in Outagamie county, on the Fox River, twenty-two miles above Green Bay. It has good railroad facilities, and is the seat of machine shops, flouring mills, and other manufacturing establishments. There are several fine school and church buildings and a growing trade in merchandise. Population, 1900, 5,115.

KAUNITZ (kow'nits), **Wenzel Anton, Prince von**, statesman and diplomat, born in Vienna, Austria, Feb. 2, 1711; died June 27, 1794. He entered upon a public career under Charles VI., and by his successor, Maria Theresa, was sent on embassies to Rome, Turin, and Florence. In 1744 he was appointed minister to the court of the Austrian Netherlands. He represented Austria at the congress of Aix-la-Chapelle, in 1748, where he demonstrated much ability as a diplomat, and soon after became minister of state. In 1750-52 he served as Austrian ambassador at Paris, concluding in the meantime an alliance between Austria and France. He was made chancellor of Austria in 1756, in which position he showed extraordinary influence for more than forty years, and sought to arrest the rise of the Prussian power by cultivating the friendship of Russia and France. With the ascension of Joseph II. his influence waned, and he resigned his office in 1792 when Francis II. ascended the throne. His long political career was marked by a decided interest in strengthening the internal affairs of the German states, but giving preferences to Austria as against Prussia. In his efforts he gave much thought to the development of education, agriculture, and commerce.

KAZAN (kä-zän'), the chief city and capital of the Russian government of Kazan, on the Kazanka River, near its junction with the Volga. It was founded in the 15th century, and was one of the capitals of the Mongol kingdom. After a prolonged siege under Ivan the Terrible, the Russians reduced it in the year 1552. It is strongly fortified, possesses extensive tanneries, soap factories, machine shops, and establishments for wool-combing, weaving, and dyeing. Near it is a government dock-yard. Its convenient navigation and numerous railroad facilities make it an important market for flour, hemp, timber, and cereals. As an educational center it is the most important of Russia. Its university was founded by Alexander I. in 1804. It has an

extensive observatory, botanical gardens, a library of 100,000 volumes, and is attended by 1,000 students. Near the city are the ship-yards in which Peter the Great built the Russian fleet, which became famous on the Caspian Sea during his reign. Population, 139,250.

KEAN, Edmund, actor, born in London, England, March 17, 1787; died at Richmond, May 15, 1833. He was the son of Aaron Kean, a stage carpenter, and father of Charles John Kean, a noted tragedian, who was born in 1811; died in London in 1868. When Edmund was a mere boy, he exhibited evidences of natural dramatic genius, and, after extended training, appeared in the character of Shylock at the Drury Lane Theater, London, in 1814. Later he played with equal success as Othello, Macbeth, Hamlet, and other characters of Shakespeare's plays. Subsequently he made an extended visit to America, returned to England in 1826, and as before enjoyed much popularity, especially in the character of Shylock. His last appearance as an actor was at Convent Garden in 1833, where he was taken with sudden insensibility, brought on largely by irregular habits.

KEARNEY (kär'-nę), county seat of Buffalo county, Nebraska, on the Platte River, about 125 miles west of Lincoln, and at the junction of several railroads. It is surrounded by a fertile stock and agricultural country, and near it is an irrigating canal about thirteen miles long, receiving its water-supply from the Platte. Among its manufactures are brick, machinery, canned articles of food, and crackers. There are numerous churches, convenient municipal facilities, and an excellent public school system. Population, 1900, 5,634.

KEARNEY, a city of Hudson county, New Jersey, at the junction of several railroad lines. It has electric street railway connections with Jersey City, is important as a manufacturing center, and has a growing trade in merchandise. There are a number of fine schools, a library, public parks, pavements, and other improvements. Population, 1900, 10,896.

KEARNY, Lawrence, naval officer, born at Perth Amboy, New Jersey, Nov. 30, 1789; died there Nov. 29, 1868. In 1807 he entered the navy as a midshipman, serving in that capacity on the frigates Constitution and President, and became a lieutenant in 1813. During the War of 1812 he won much distinction against the British, and by clearing the West Indies and the Gulf of Mexico of pirate hordes. He was promoted to the rank of captain in 1832, secured commercial concessions from China in 1841, and in 1866 was made commodore and placed on the retired list.

KEARNY, Philip, soldier, born in New York City, June 2, 1815; slain at Chantilly, Virginia, Sept. 1, 1862. In 1837 he entered the army and two years later went to Europe to study French military tactics. After attending the cavalry school at Saumur, he enlisted in the French army, with which he rendered service during the campaigns in Algeria. He returned to America in 1840, was soon after attached to the staff of General Scott, made captain in 1846, and lost an arm during a brave assault upon the city of Mexico. Later he served in the war against the Oregon Indians. In 1859 he reëntered the service of France, and for bravery at Solferino was decorated with the cross of the Legion of Honor. At the commencement of the Civil War he returned to America, was promoted major-general, and during an assault was killed in battle. General Scott spoke of him as being the most nearly perfect soldier and bravest man he ever knew.

KEARNY, Stephen W., general, uncle of Philip Kearny, born in Newark, New Jersey, Aug. 30, 1794; died in St. Louis, Oct. 31, 1848. He entered the army at the beginning of the War of 1812 as a lieutenant, was made captain the following year, and in 1846 became brigadier-general, taking possession of New Mexico at the beginning of the Mexican War. In 1847 he was appointed governor of California, and the following year was made military governor of Vera Cruz and the city of Mexico. He wrote "Manual for the Exercise and Manœuvering of United States Dragoons" and several other works on military tactics.

KEARSARGE (kēr'särj), a famous battleship of the United States, which was used for effective service in the Civil War. It was launched at Portsmouth, New Hampshire, in 1861, and on June 19, 1864, engaged in battle the Confederate cruiser Alabama off the harbor of Cherbourg, France, disabling and sinking that privateer, which had destroyed the American merchant marine. In 1894 the Kearsarge was wrecked in the Caribbean Sea, though the officers and crew were saved. The vessel was burned by natives before a wrecking party arrived.

KEATS (keets), **John**, poet, born in London, England, Oct. 29, 1795; died in Rome, Italy, Feb. 27, 1821. He received his education mainly at Enfield, was apprenticed to a surgeon in 1810, and practiced medicine seven years. Subsequently he devoted his attention entirely to literature, and produced numerous poems of decided value. Keats died of consumption and was buried in Rome. Among the most noteworthy of his works are "Endymion," a poetic romance; "Eve of St. Agnes;" "Hyperion," and

JOHN KEATS.

"Isabella." He also contributed numerous sonnets to the "Examiner."

KEBLE (kee'b'l), **John**, clergyman and poet, born in Fairford, England, April 25, 1792; died at Bournemouth, March 29, 1866. His early education was in his native town under the direction of his father. He entered Oxford at fifteen, and in 1816 was ordained priest. Though manifesting a desire to fill a pastoral charge, he remained at Oxford as a public examiner in the school and as tutor at Oriel College until 1823. Four years later he published a volume of religious poems entitled "The Christian Year." This book of poems had a wide circulation, and went through 158 editions before 1872. Later he spent much time in laboring on the tract movement for religious reforms. His contributions included four numbers; namely, 4, 13, 40, and 89; the last of the series being Newman's tract No. 90, which appeared in 1841. His religious work, like that done in college, was marked with a high degree of ability.

KEEL, the lower timber of a wooden ship or vessel, answering to the spine, and giving the main support to the ribs and the whole structure. In most wooden vessels an additional timber beneath is called a false keel, and a piece bolted to the keel on the inside is called the keelson. Iron vessels are arranged with entirely different parts.

KEELEY, Leslie E., physician, born in St. Lawrence county, New York, in 1836; died in Los Angeles, California, Feb. 21, 1900. At an early age he removed to Michigan, graduated from the Chicago Rush Medical College in 1864, and also received a degree from the University of St. Louis. He was a surgeon in the Civil War, and in 1866 located for the general practice of medicine in Dwight, Illinois. There he attained a reputation on account of his treatment of alcoholism and narcotism, both of which he regarded as diseases, and applied curative treatment in connection with social and moral agencies as auxiliary means. The medical treatment became known as the gold cure, owing to the use of chloride of gold as the essential drug. Subsequently many similar institutions were organized in the United States, which became known as the Keeley institutes. Those having taken treatment in the institutes maintain a national society called the Keeley League. In 1896 Dr. Keeley published a work entitled "Non-Heredity of Inebriety."

KEENE, a city in New Hampshire, county seat of Cheshire county, on the Ashuelot River, about ninety miles northwest of Boston. The city is beautifully situated. It has a handsome monument dedicated to the soldiers of the Civil War, a library of 12,000 volumes, and good railroad facilities. Among the manufactures are machinery, furniture, vehicles, ironware, woolen fabrics, and shoes. There are electric lights and street railways, waterworks, pavements, and fine county buildings. Population, 1900, 9,165.

KELLERMAN (kĕl'er-man), **Francois Christophe**, duke of Valmy and marshal of France, born in Strasburg, Germany, May 30, 1735; died Sept. 12, 1820. He served in the Seven Years' War as a volunteer in the French army, supported the Revolution of 1789, and in 1791 became general in Alsace. Later he distinguished himself in the French expedition to Italy, and for his service Napoleon named him successively senator, marshal of France, and duke of Valmy. He voted for the deposition of the emperor in 1814, and later supported the liberals in the high chamber.

KELLOGG (kĕl'ŏg), **Clara Louise**, operatic singer, born in Sumterville, South Carolina, in 1842. Her musical talent was developed early. She secured her education of an artist in New York City, where she sang in the Academy of Music in the winter of 1861-62. Subsequently she obtained favor at London, where she met with enthusiastic reception at different theaters several seasons successively. In 1872 she returned to America, made strolling tours of the most important cities, and again engaged with a London company, where she appeared in Drury Lane with Nilsson. Subsequently she became known in all the leading countries of the world. Her popularity is such as her rare gifts and splendid attainments justify. She was most popular in "Il Poliuto" and "Faust."

KELVIN, Lord. See **Thomson, Sir William.**

KEMBLE (kĕm'b'l), **John Philip**, tragedian, born in Prescot, Lancashire, England, Feb. 1, 1757; died in Lausanne, Switzerland, Feb. 20, 1823. He studied four years in Wolverhampton, and took a course at the college of Douai, France, with the view of becoming a Roman Catholic priest. After completing the course, he concluded to go on the stage as an actor, and first appeared professionally at Wolverhampton in 1776. In 1783 he played Hamlet and other Shakesperean characters at Drury Lane, London, and by his keen conception of the characters aroused enthusiastic approval. He purchased an interest in the Covent Garden theater for $115,000, and appeared there successively until 1817, when he retired from the stage, and, after a tour of the continent, settled at Lausanne. He was esteemed both in his professional and private life.

KEMPIS (kĕm'pĭs), **Thomas à**, clergyman and author, born at Kempen, near Cologne, Germany, in 1379; died July 26, 1471. In 1399 he entered the Augustinian convent of Mount St. Agnes, near Zwolle, in the Netherlands, and spent a long and useful life in that capacity. Priest's orders were given him in 1413, and he became subprior in 1425. His numerous sermons, letters, hymns, and historical biographies

show him as a man of much piety and learning, and the influence that he wielded gave evidence of his devotion and ability. His greatest work is "Imitation of Christ," in which are contained evidences of passionate and pious religious devotion. This production has been translated almost as largely as the Bible. Its authorship was a matter of doubt for many years, but it is generally conceded to Kempis. The name of this celebrated writer is properly Thomas Hemmerken, meaning in German, "Little Hammer," but he was named Kempis from the place where he was born.

KENILWORTH, a small market town of Warwickshire, England, situated on a tributary of the Avon, about ninety miles north of London. It is noted for its castle, which, until the year 1563, was a crown possession, and at that time was given to Robert Dudley, earl of Leicester (q. v.), by Queen Elizabeth. This earl entertained the queen there in the year 1565 for a period of eighteen days at a daily cost of $5,000. Sir Walter Scott's novel, "Kenilworth," is based upon this gorgeous entertainment.

KENNEBEC (kĕn′ę-bĕk), a river of Maine, being next to the Penobscot the most important in the state. It rises in Moosehead Lake, has a course generally south, and flows into the Atlantic Ocean. Its length is 150 miles, falling 1,000 feet, and is navigable for ships to Bath and for steamers beyond Augusta. Among the cities on its banks are Bath, Augusta, and Waterville.

KENOSHA (kę-nō′shą), a city in Wisconsin, county seat of Kenosha county, on Lake Michigan, at the junction of several important railroads, about thirty-two miles south of Milwaukee. It has a commodious harbor, contains several parks and two water-cure establishments, and is surrounded by a dairying and farming country. Among its manufactures are machinery, furniture, wagons, wire-mattresses, hosiery, malt, bicycles, and ironware. Its general facilities include a library, pavements, lighting, system of rapid transit, and numerous religious and civic societies. It has a fine county courthouse, several excellent schools, and a considerable trade. Population, 1900, 11,606.

KENSINGTON GARDENS, a park about two miles in circumference, situated in the city of London, England. It contains Kensington palace, which was purchased in 1689 by William III. This palace served as a royal residence for more than a century.

KENT, James, jurist, born in Philippi, New York, July 31, 1763; died Dec. 12, 1847. In 1781 he graduated from Yale College, and studied law. He was admitted to the bar in 1785 and established a practice at Poughkeepsie. After serving two terms in the state legislature, he was professor of law at Columbia College in 1794-98, was successively appointed master in chancery, recorder, judge of the supreme court, and in 1804 chief justice, serving in the last named position ten years. In 1814 he became chancellor of the state, serving nine years, and was again professor of law at Columbia College in 1824-25. As a judge of law and an advocate he took high rank. He published a treatise on law, entitled "Commentaries on American Law," which is accepted as a general standard.

KENTON, a manufacturing city of Harden county, Ohio, on the Scioto River. It is provided with excellent railroad connections, making it a convenient market for produce and manufactures. The products include machinery, ironware, furniture, strawboard, and bee-keepers' supplies. It is the seat of the largest iron fence factory in America. There are numerous municipal facilities, good schools, and a number of fine churches. Population, 1900, 6,852.

KENTON, Simon, hunter and pioneer, born in Fauquier county, Virginia, April 3, 1755; died April 29, 1836. When sixteen years of age, he engaged in an affray with a rival in love, and, thinking he had killed his adversary, fled to Kentucky, where he became associated with Daniel Boone as a spy against the Indians. In 1778 he was captured by the Indians, but escaped. He became major of a battalion of Kentucky volunteers in 1793, and aided in the expeditions to guard the western frontiers. He was made brigadier-general of Ohio militia in 1805, took an efficient part in the War of 1812, and after its close lost his vast possessions in Kentucky by the encroachment of settlers and his failure to secure perfect title. In 1824 he appeared before the Kentucky legislature in tattered garments and petitioned for relief. His request was granted, and later congress voted him a pension of $240 a year.

KENTUCKY (kĕn-tŭck′ĭ), a southern state of the United States, bounded on the west and north by Missouri, Illinois, Indiana, and Ohio; east by West Virginia and Virginia, and south by Tennessee. Its greatest breadth is 190 miles, extreme length from east to west 456 miles, and area 40,400 square miles, about as large as Ohio, or Maine and New Jersey combined. The surface slopes from the southeast to northwest and constitutes an elevated plateau, most of which is productive. The Cumberland Mountains and Kentucky Ridge are in the southeastern portion, and form elevations from 1,800 to 3,550 feet above sea-level. In the interior and northeastern portions the elevations are from 300 to about 1,000 feet above sea-level, much of which includes the celebrated blue-grass region. Swamps abound in the southwestern parts among the elevated ridges, and are marked by the abundance of extensive cypress forests. In the same region, but somewhat toward the west, are extensive limestone formations that extend to the central part, and contain

the large Mammoth Cave (q. v.). The rivers include the Cumberland, Tennessee, Licking, Greene, Kentucky, and Tradewater, all of which flow into the Ohio River. On the east is the Big Sandy, north the Ohio, and west the Mississippi. Many of the rivers are navigable and supply splendid facilities for interior commercial connections. There is an abundance of rainfall, the climate is mild and pleasant, and winds prevailing in the winter are largely from the northwest, and in the summer from the southwest. The mean temperature ranges from 50° to 58°, and the annual rainfall varies from about forty to fifty inches. Its pleasant winters facilitate the raising of all kinds of stock, which may be reared without much feed aside from the pasture.

Kentucky contains many productive mineral deposits, among them iron ore, coal, limestone, fire-clay, salt, and mineral oils. The coal deposits include an area of 10,500 square miles, and the annual production is 4,250,000 tons, employing 16,500 persons. Iron ore exists in more or less paying quantities in about one-half of the state, while building-stone abounds extensively, and salt deposits are found in connection with the mineral oils by boring. Originally the state was almost entirely covered with dense forests, and at present two-thirds of the surface retains the virgin timber, the remainder being under a high state of cultivation. The forests include maple, oak, pine, ash, walnut, tulip, elm, cypress, and sweet-gum trees. Among the productions of agriculture are corn, rye, barley, wheat, oats, hemp, a wide range of vegetables, hay, fruits, and tobacco.

The manufacture of tobacco represents an annual value of $12,500,000, while as a dairying state it has taken high rank, and has frequently stood highest as a producer of milk per cow. Its production of hemp is the largest in the states, 23,500 acres being devoted to the culture of that product, being about ninety per cent. of the entire acreage in the United States. The surface employed in the culture of tobacco is fully 275,000 acres, or about thirty-nine per cent. of the entire area, and fully one-half of the total acreage devoted to tobacco culture in the Union. Kentucky horses, cattle, sheep, and swine are noted for their high grade and physical qualities, and form an important and growing source of income. The horses now in the state number about 450,000; mules, 175,000; cattle, 1,250,000; swine, 2,275,000; and sheep, 975,000. There are extensive general manufactures, owing to the large and superior supply of many kinds of raw materials. The industry of distilling yields annually commercial products valued at $16,500,000. Other vast industries include manufactures of cigars, iron and steel, furniture, machinery, agricultural implements, flour, and cotton and woolen goods. Railroads penetrate the state extensively, and together with the navigable rivers place Kentucky among the easily accessible regions for interior commercial enterprises. The total railroad lines aggregate 3,250 miles.

The educational aspect of Kentucky is healthful, common schools and higher institutions being maintained by interest on state bonds and by general taxation. Colored children have access to separate schools and constitute about one-eighth of those eligible to attendance, the total, in 1900, being 798,027. The Kentucky University was founded at Lexington in 1798, and, besides it, there are thirty-five colleges and about sixty-five academies, and also numerous institutions for special culture. Among the more important institutions of education, besides the university, are the Kentucky Military Institute, Farmdale; St. Joseph's College, Bradstown; South Kentucky College, Hopkinsville; Ogden College, Bowling Green; Murray Male and Female Institute and Normal School, Murray; St. Mary's College, St. Mary's; Eminence College, Eminence; Georgetown College, Georgetown; Central University, Richmond; Center College, Danville; and Liberty College, Glasgow. The state also maintains a well organized system of reformatory and charitable institutions, including the institution for the education of the blind, Louisville; Kentucky institution for deaf mutes, Danville; institution for feeble-minded children, Frankfort; state prison, Frankfort; and numerous hospitals and asylums. There are 350 periodicals, including thirty-five daily newspapers, 260 weeklies, and numerous others devoted to science, sociology, civics, and other educational arts. All the leading civic and religious societies maintain growing organizations.

Kentucky, like other states of the Mississippi valley, contains historic relics of the mound-builders. Its name signifies, "The dark and bloody ground," and was derived from the different tribes of Indians who met in various warlike conflicts in the region, which did not form the possession of a single tribe. Daniel Boone made an exploring expedition from North Carolina in 1769, and the first settlement was formed at Harrodsburg by James Harrod in 1774. Originally the entire territory was included with the colony of Virginia. It was made a separate territory in 1790 and admitted into the Union as a state in 1792. The state did not secede during the Civil War, though Kentuckians served in both armies, and it was represented in the Confederate congress. Lincoln proclaimed martial law in the state in 1864, and Johnson restored civil authority the following year. It is divided into 119 counties, and contains numerous important commercial centers. It is popularly called the Blue Grass State. Frankfort is the capital. Other important cities include Louisville, Lexington, Owensboro, Bowling

Green, Covington, Newport, Paducah, Henderson, and Hopkinsville. The population according to the census of 1900 is 2,147,174. In this number are included 284,706 Negroes, 57 Chinese, and 102 Indians, this being the total colored population, or 13.3 per cent. of the inhabitants of the state.

KENTUCKY, a river in Kentucky, formed in Lee county by the junction of three forks that rise in the Cumberland Mountains, and after a tortuous course of about 260 miles flows into the Ohio River at Carrollton. It courses through a rich mineral and agricultural country, has been improved in its lower portion, and is navigable beyond Frankfort. Its valley contains deposits of coal, iron ore, and marble.

KEOKUK (kē'ō-kŭk), a city of Iowa, in Lee county, situated on the Mississippi River, over which it is connected by a fine railroad bridge with Warsaw and Hamilton. Besides its system of public schools, it contains a Lutheran school, Roman Catholic academy, business and medical colleges, and several educational societies. Formerly the larger steamboats could not pass north from Keokuk on the Mississippi because of the Des Moines rapids. To facilitate the passage of the largest vessels the United States government constructed a canal about eleven miles long and 300 feet wide, at a cost of $8,000,000, round these rapids, which constitutes the most important national improvement in Iowa. The site of the city is on limestone bluffs 150 feet high. The business blocks are substantial and largely of native material. There are good general facilities, including electric street railways and lights, pavements, a public library, and numerous churches. Its excellent railroad facilities have made Keokuk a prosperous commercial center, and built up an extensive market and large jobbing trade. Among the manufactured articles are starch, flour, machinery, clothing, pottery, firearms, and gunpowder. It is popularly called the Gate City. Population, 1900, 14,641.

KEPLER (kep'lẹr), **Johann**, eminent astronomer, born at Weilderstadt, in Würtemberg, Germany, Dec. 27, 1571; died in Ratisbon, Nov. 15, 1630. He was left to his own resources when a child, because of which his early education was neglected, but later studied at Maulbronn, graduated at the University of Tübingen, and in 1593 became teacher of mathematics at Gratz, in Styria. During his residence at that city he devoted himself with much zeal to the study of astronomy, but when the religious persecution began, in 1599, he accepted an election to Prague tendered by Tycho Brahe. There he assisted in the preparation of astronomical charts and tables, and, after the death of Tycho, continued this work by himself, and received an appointment under Ferdinand II. as imperial mathematician and astronomer. Later he accepted an appointment at Ratisbon, and there, as elsewhere, he suffered the pangs of poverty, owing to an inadequate salary. In 1602 he published "Principles of Astronomy." The work of Kepler is of vast importance. Though Copernicus had established clearly the motion of the planets, it was still held that heavenly bodies move without unity and fixed natural laws, but it was generally thought that the sun is the common center of all. The three great laws of Kepler were announced after studying a quarter of a century, and form the basic beginning of modern astronomy. These are: 1. The planets move in ellipses with the sun at one focus. 2. The radius vector of each planet sweeps over equal areas in equal times. 3. The squares of the times of the revolution of the planets are proportional to the cubes of their distance from the sun. Besides these, he announced the law of diminution of light in proportion to the inverse square of the distance; the decrease in the attractive force of the sun with distance, and also many valuable discoveries in geometry and physics. His most important publication is "New Astronomy; or, Celestial Physics Delivered in Commentaries on the Motion of Mars." Many of the theories of Kepler were not accepted until long after his death, and some of his books were prohibited by the inquisition. In speaking of his "Harmonies of the World," he said: "It may well wait a century for a reader, as God has waited 6,000 years for an observer."

JOHANN KEPLER.

KEROSENE, the principal product secured in refining petroleum. See **Petroleum.**

KERSHAW, Joseph Brevard, general, born in Camden, South Carolina, Jan. 5, 1822; died April 13, 1894. In 1843 he was admitted to the bar, and served in the state senate in 1852-57. At the beginning of the Civil War he raised a regiment for service in the Confederate army, and rose to the rank of brigadier-general before the end of the war. Among the battles in which he took a prominent part are Fredericksburg, Bull Run, Antietam, Chancellorsville, Chickamauga, and Gettysburg. In 1865-66 he was president of the state senate, later judge of the circuit court of the state, and postmaster at Camden at the time of his death.

KEWANEE (kẹ-wạ'nē), a city of Henry county, Illinois, about 130 miles southwest of Chicago. It is surrounded by a fertile agricultural, fruit-growing, and dairying country, and has good railroad connections. There are electric lights, paved streets, and

excellent public schools. The manufactures include pumps, flour, ironware, windmills, bottled goods, and machinery. It is a commercial center, and within its vicinity are large quantities of coal. Population, 1900, 8,382.

KEY, Francis Scott, distinguished American, born in Frederick county, Maryland, Aug. 9, 1780; died in Baltimore, Maryland, Jan. 11, 1843. He took a course at St. John's College, Annapolis, studied law, and entered upon the practice at Frederick City, Maryland. Later he became district attorney at Washington, D. C. The British invaded Washington in 1814, when William Beans, a planter, was made prisoner, and Key resolved to secure his release. While attempting to carry out his design, he also was made a prisoner and detained on a British man-of-war, being confined there during the bombardment of Fort Sumter. In the morning he watched anxiously to see whether the American flag was still floating, and, when seeing it waving, he found expression in the "Star-Spangled Banner," a song that gave him a lasting reputation. James Lick, of California, gave $60,000 to build a monument for Key, which was erected in 1887 in the Golden Gate Park, San Francisco.

KEY WEST, the most southern city of the United States, situated on the island of Key West, sixty miles southwest of Cape Sable. It is a port of entry and the county seat of Monroe county, Florida. The city has a good harbor. There are numerous public buildings; among them the courthouse, customhouse, marine hospital, and the United States building. The streets are improved by pavements, lighted by electricity, and are provided with several street railway lines. There is an important jobbing trade, especially in tobacco and fruits. Among the manufactures are cigars, smoking and chewing tobacco, clothing, and machinery. The climate is agreeable, equable, and as a health resort it is an especial favorite for consumptives. It is an important military point. The principal fortification of the island is Fort Taylor, a casemated brick structure. The island of Key West is about seven miles long, from two to three miles wide, and has an elevation of about ten feet above sea-level. Population, 1900, 17,114.

KHARKOV (kär-kŏf), a government in the south central part of Russia in Europe, containing an area of 21,040 square miles, and a population of 2,245,375. Kharkov, the capital, is one of the most important cities of southern Russia. It is situated at the junction of the Lopan and Kharkov rivers, and is a convenient railroad center. Besides numerous public schools and churches, it is the seat of the University of Kharkov. The surrounding country is fertile and produces large quantities of bituminous coal and petroleum. Among the manufactures are beet-sugar, candles, leather, machinery, soap, and canned fruit. Population, 196,842.

KHARTUM (kär-tōōm′), an important city in eastern Soudan, situated on the Blue Nile, near its junction with the White Nile. In 1830 it began to grow rapidly, and soon after became the capital of the Egyptian Soudan, when it developed an important trade in gum, senna, ivory, ostrich feathers, and fruits. The older portions contain numerous houses constructed of sun-dried brick, but in the newer part the buildings are imposing and largely built of native wood and stone. In 1884-85 General Gordon was held captive in the city by superior forces under command of the native mahdi, and was slain along with many others before the British relief army arrived. Population, 72,500.

KHEDIVE (kȧ-dēv′), the title of Egyptian rulers, and first used in 1866, when it was applied to Ismail Pasha. The word signifies lord or lordship.

KHIVA (kē′vä), a semi-independent khanate in Central Asia, forming a part of Turkestan. The general surface is sandy, but there are numerous fertile tracts. It is inhabited by various resident and nomadic tribes. The entire area is about 22,000 square miles, and the population 700,000. It is governed from Khiva, a city situated on two canals west of the Amur River, which contains a population of 20,000. In 1717 Peter the Great of Russia sent an expedition to conquer Khiva, and a second attempt was made by Czar Nicholas in 1839. Since 1873 it has been under Russian influence, and south of it passes the Trans-Caspian railroad, from the Caspian Sea to Samarkand. The construction of this railroad line has materially affected its importance, and has given an impetus to various manufactures. Khiva is the seat of several Mohammedan colleges, has many bazaars, and is fortified by walls and earthworks.

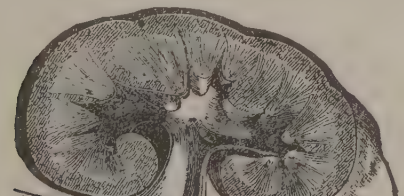
KHYBER PASS (ki′ber), a military road between Afghanistan and the Punjab. This pass is an important strategic point, has a length of thirty miles, and a width of from ten feet to 150 yards. The cliffs on either side rise perpendicularly to heights of from 800 to 3,000 feet. Alexander the Great, as well as the Russian and British, found the pass of vast importance in military operations. It constitutes the key to northern Afghanistan.

KICKAPOO INDIANS (kĭck-ȧ-pōō′), a tribe of Algonquin Indians, who were first met with by the French and English pioneers of the Ohio valley, but whose largest centers were on the Illinois River. In 1779 they assisted the French against the English, but, after being defeated by Wayne, they ceded a part of their lands, in 1802-4. They allied themselves with the English in the War of 1812, but sustained disastrous defeats, and in 1822 the majority removed from the Illinois to the Osage. The greater number emigrated to Kansas in 1854, and in 1863 a large party removed to Mexico, but

ten years later returned and settled in Indian Territory. The present number of Kickapoos in the United States is 550, of whom about 230 reside in Kansas. Within recent years many have been favorably inclined to education, and have taken up civil arts.

KIDD, William, Scotch pirate, known as Captain Kidd, born in Greenock, about the middle of the 17th century. He went to sea when a mere lad, attained a high reputation for stubborn courage against the French, and in 1691 was granted a reward of $750 from the city of New York. Soon after he was given command of a vessel to suppress piracy in the Indian Ocean, and furnished with letters of marque. He reached Madagascar in 1697, where, after some time, he was suspected of engaging in the traffic he was commissioned to destroy, and later became one of the most noted of pirates. He was arrested on his return to New England in 1699 and sent to England for trial, where he was found guilty of murdering one of his men, and hanged in London on May 24, 1701, though protesting innocence to the last. The trial was unfair, and it is quite probable that he was not guilty of the crime for which he was executed. One of Edgar Allan Poe's tales is based on the legend that Kidd buried treasures of vast value on the banks of the Hudson or the shores of Long Island Sound.

KIDNEYS, two glands having the function of secreting urine from the system, situated at the back of the abdominal cavity, one on each side of the vertebral column.



SECTION OF KIDNEY.

The shape of these organs is that of the kidney bean, the concave side being turned inward and toward the spine, and each imbedded in a layer of fatty tissue. The average weight is from four to six ounces, length about four inches, color deep red, and their constitution dense and fragile. Among the diseases of the kidneys is the well known Bright's disease (q. v.).

KIEL (kēl), a city of Germany, capital of Schleswig-Holstein, situated on Kieler Hafen, an inlet of the Baltic Sea. It is the seat of important shipbuilding, iron foundries, tobacco works, machine shops, sugar factories, oil mills, and engineering works. Besides its numerous public schools and historic churches, it is the seat of a noted university, which has an attendance of 500 students and a library of 175,000 volumes. The city is supplied with all modern municipal facilities. It has extensive railroad connections, electric street railways, and is connected with the Elbe by a ship canal. As a member of the Hanseatic League it attained much commercial importance. Population, 90,380.

KIEV, or **Kieff** (kē-ĕf′), a government in southwestern European Russia. It has an area of 19,690 square miles, and a population of 2,525,365. The capital, Kiev, is an important commercial and manufacturing city. It is situated on the Dnieper River, contains many railroad lines, and is the seat of numerous educational institutions. The University of Kiev has fine botanical and zoological gardens, extensive courses of study, and is attended by 2,675 students. There are manufactures of beet sugar, clothing, machinery, woolen goods, porcelain, and tobacco. The surrounding country is farming and dairying, and has a mild climate. Kiev is an important commercial center. Population, 194,148.

KILAUEA (kē-lou-ā′ä), one of the most noted volcanoes in the world, situated on the island of Hawaii. The crater is oval and has a circumference of about eight miles. Volcanic action is constant, the most extensive disturbances occurring in 1789, 1823, 1832, 1840, and 1866.

KILIMA-NJARO (kĭl′ē-män-jä-rō′), a celebrated snow-clad mountain in German East Africa, situated about one hundred miles from the port of Mombasa, and about 150 miles from Lake Victoria Nyanza. There are two elevated peaks or craters called Kimawenzi and Kibo, the highest of which is 19,680 feet above sea-level. It forms the most elevated peak of the African continent. The summit is covered with snow perpetually, but on its lower slopes are fine forests.

KILLARNEY (kĭl-är′nĭ), a noted town of Kerry county, Ireland, celebrated as a resort for tourists, and on account of three beautiful lakes within the immediate vicinity. The smaller of the lakes has an area of 430 acres; largest, 5,000 acres, and the one known as the middle lake, 680 acres. These lakes are famous for their remarkable beauty and the shady dells surrounding them. Numerous picturesque islands dot their surface. The town has a population of 5,680.

KILN (kĭl), a structure or furnace of brick or stone used for calcining, baking, burning, drying, or annealing various substances, especially such as brick, iron ore, corn, cement, hops, pottery, and malt. Kilns are constructed according to various patterns best fitted for the purpose for which they are intended, but in all of them it is designed to generate an abundance of constant heat with the least possible consumption of fuel. Those intended for drying and baking cereals, or their products, are often constructed of light material, while those designed for

generating great heat are made of the best fire-clay brick.

KILPATRICK (kĭl-păt'rĭk), **Hugh Judson**, soldier, born near Deckertown, New Jersey, Jan. 14, 1836; died in Valparaiso, Chili, Dec. 4, 1881. He graduated from West Point in 1861, and immediately entered the Union army as second lieutenant of artillery. On June 10 of the same year he was wounded at Big Bethel, and after his recovery was commissioned lieutenant-colonel. His services were mostly in the east, but in 1864 he joined Sherman on the march to the sea, and in 1865 was made major-general. President Grant appointed him minister to Chili in 1868, and he was appointed to the same position in 1881, at which time his death occurred. He was familiarly known as General Fitz-Kilpatrick, and was a popular republican campaign orator. His best known lecture is "The Irish Boy of the Rebellion."

KIMBERLEY (kĭm'bĕr-lĭ), an important city and capital of Griqualand, South Africa, situated about 540 miles northeast of Cape Town. It has an exceedingly favorable climate, regular streets, and numerous important improvements, among them electric lights and street cars, waterworks, a large public library, and several government buildings. It was the seat of the De Beers Consolidated Company for some time prior to the war between England and the Transvaal Republic, and during that conflict was besieged by a formidable Boer army. The city is well connected by railroads and surrounded by a fertile agricultural and mining country. Within its immediate vicinity are some of the most celebrated diamond mines now operated. Population, 38,975.

KINDERGARTEN (kĭn'dĕr-gär-tĕn), a name applied by Friedrich Froebel to a system of education devised by him for young children, the word signifying in German, "garden for children." The system is based on the fundamental idea that the nature and faculties of children must be understood, and their playful tendencies employed by active realities in the form of objects. To secure this end it is necessary to make use of familiar objects which the children are interested in, and by observing their characteristics develop perceptive power as well as moral and intellectual strength. Froebel held to the theory that all learning is pleasurable, and, when the playful activities are rightly employed, they learn with ever-growing interest, thus developing mental and physical strength and a consciousness of right and wrong. The objects employed with greatest success in kindergartens are such as toys, pictures, tools, flowers, beetles, and various other convenient and familiar forms that the child is allowed to handle, or use as objects for conversational lessons and for various simple drawings.

By bringing the children in contact with the useful and convenient at an early age, it is possible to give them an early bent toward acquiring right tendencies, as well as to give them traits of industry and strength of character. To make the work most highly efficient it is necessary for the teacher to possess and cultivate a true motherly spirit, through which the children under her care may be encouraged by the most wholesome relations. In this way growth is stimulated under right and spontaneous activities. From the incentive given by Froebel kindergartens rapidly spread to all civilized countries, and at present are supported extensively in the United States. In the larger cities special training schools are maintained for properly preparing teachers for kindergarten work, and the instruction given to the young children is with a direct view of having the preparation fit for entrance into the regular primary and second primary departments of the school course. Associated with these kindergartens are also manual training departments, whereby industrial training may be successfully carried though all the lower as well as the higher grades. A modified system of kindergartens has been introduced also in the schools for blind and feeble-minded children. In recent years the study of kindergarten methods has been facilitated greatly by the publication of numerous periodicals and teachers' textbooks, while all the higher classes of normal schools have added departments for teaching kindergarten methods.

KING, Rufus, statesman, born in Scarborough, Maine, April 29, 1755; died at Jamaica, Long Island, April 29, 1827. In 1777 he graduated at Harvard University, studied law, and entered upon a successful practice at Newburyport, Mass. He was elected a member of the legislature in 1782, and to the continental congress at Trenton in 1784, where he introduced a resolution favorable to the abolition of slavery in the territories of the United States. In 1787 he was a member of the federal constitutional convention, and in 1796 President Washington appointed him minister to England, in which position he served eight years. He was reëlected to the United States senate in 1813, having served in that capacity before his appointment to England, continuing in that position till 1825, when he was again appointed minister to England. Owing to ill health he resigned the following year and returned to the United States. As a statesman and orator King took high rank among the noted men of America, while as an opponent to slavery he was among the earliest and most persistent. His son, Charles King (1789-1867), was editor of the "New York American," and in 1849-64 president of Columbia College. He published "New York Fifty Years Ago."

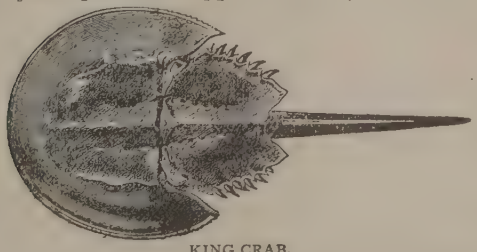
KING BIRD, the name of an American bird, also called bee martin and flycatcher. It is about eight inches long, the extended wings measuring fourteen inches. The bill

is short and stout, tail slightly rounded and longer than the wings, and the color is bluish-ash. On the head is a small patch of bright red feathers, usually concealed, but

KING BIRD.

capable of being erected as a crest. The nest is built in trees, in which four to six eggs are laid, and the parents defend it with remarkable bravery. It is not uncommon to see the king bird pursue hawks and other birds for some distance to drive them from the vicinity of its nest, from which habit it has been named. The king bird is useful in devouring noxious insects, but also eats fruits and seeds.

KING CRAB, a genus of crabs so called from their great size. They are found in the tropical and northern coasts of America, in the Antilles, Japan, and the archipelago southeast of Asia. There are many well marked species. They have two pairs of eyes upon the upper surface; the head



KING CRAB.

resembles a broad horseshoe; the mouth opens on the lower surface; the tail is spine-like, and there are six legs on each side. The average length of king crabs is about two feet. They do not possess power to swim, and, like turtles, appear to be in agony when placed upon their backs.

KINGFISHER, a family of incessorial birds noted for their bright plumage, stout bill, strong feet, and short tail. There are various varieties common to America and Eurasia, of which the common kingfisher is the best known. This species has a head spotted with blue, sides of neck greenish, feet red, and bill black. The length of the body is about seven inches. It frequents the coasts of lakes and banks of streams, where it engages in catching fish for food. In endeavoring to catch its prey the kingfisher occupies a position where it may watch the fish, and, when an opportune time occurs, darts down quickly and secures its prey by diving. The smaller fish are swallowed whole, while the flesh of larger varieties is picked from the bones after being carried to the perch, and the bones are used in building its nest. The eggs are nearly white, six to eight in number, and the nest is guarded with considerable care against intrusion of other birds. A species of kingfisher native to the Himalayas is spotted, and is known as the fish-tiger. The laughing-jackass, so called from its peculiar cry,

KINGFISHER.

is a large species native to Australia. It is singular that the kingfisher is the subject of many superstitions, and is celebrated in the ancient poetic lore and mythology. See Halcyon.

KINGLAKE, Alexander William, statesman and historian, born at Wilton House, England, in 1811; died in London, Jan. 2, 1891. He studied at Eton and Cambridge, and in 1837 was admitted to the bar. In 1845 he witnessed the campaign of the French in Algeria, and likewise studied military tactics of the allied armies in the Crimea. He was elected to parliament in 1857, where he held a seat for eleven years. His attention was devoted to politics and literature continuously after 1856, but his weak voice prevented him from making a deep impression, such as his ability warranted. His history entitled "Invasion of the Crimea" consists of eight volumes, the first appearing in 1863 and the last in 1887. On account of its partiality to Lord Raglan, with whom he sojourned in the Crimea, it

was severely criticised, but as a historic production has taken high rank.

KINGSLEY (kĭngz'lĭ), **Charles**, clergyman and author, born in Devonshire, England, June 12, 1819; died Jan. 23, 1875. He studied at King's College, London, and Cambridge, taking a degree at the latter in 1842. In 1844 he was called as rector to Eversley, in Hampshire, where he continued his labors until death, and there obtained a high reputation as a writer and pulpit orator. In 1859 he was appointed professor of modern history at Cambridge, and ten years later became canon of Chester. His writings include "Saints' Tragedy;" "Alton Locke;" "Westward Ho;" "Water Babies;" "Alexandria and Her Schools;" "Loose Thoughts for Loose Thinkers;" "Hypatia," and "Two Years Ago." "Letters and Memories of His Life" was edited by his wife, and appeared in 1877.

KING'S MOUNTAIN, the name applied to a mountain range in North Carolina, which was the scene of a battle on Oct. 7, 1780, between the British and Americans. The Americans were commanded by Benjamin Cleaveland, and the British by Colonel Ferguson. The battle terminated in favor of the Americans, but they lost their brilliant leader, Col. James Williams. Ferguson also fell and with him 390 of his men, while 716 British were taken prisoners. The Americans lost only twenty men killed, but many were wounded. This battle had a favorable influence upon the American cause.

KINGSTON (kĭngz'tŏn), a city in New York, county seat of Ulster county, on the Hudson River, about eighty-seven miles north of New York City. It is noted as an important railroad center and canal terminus, and is the seat of a large commercial trade. The canal facilitates the shipment of large quantities of coal from Pennsylvania, which is reshipped by rail and river navigation to other points. There are manufactures of glass, cement, farming machinery, cigars, railroad iron, flour, earthenware, and liquors. Its general facilities are modern, embracing libraries, street railways, public lighting, waterworks, and pavements. Population, 1900, 24,535.

KINGSTON, the most important city and capital of the island of Jamaica, situated in the southeastern part, and noted for its excellent harbor. It is defended by several forts, has an extensive commercial trade, and contains a number of excellent buildings and municipal facilities. Spanish Town became the capital in 1858, but the seat of government was moved to Kingston in 1872, since which time it has been enjoying marked prosperity. There are exports of rum, sugar, tobacco, dyewood, coffee, and fruits. Population, 47,535.

KIPLING, Rudyard, Anglo-Indian author, born in Bombay, India, in 1865. His father, John Lockwood Kipling, was connected with the Mayo School of Industrial Art, Bombay, for many years, and with the government museum in the same city Rudyard Kipling was educated in India and England, and in 1880 did some writing for the "Lahore Civil and Military Gazette." From this time on he continued a prolific writer and produced many interesting and popular works. His first writings include "In and Out of India;" "City of the Dreadful Night;" "Plain Tales from the Hills," and "Light that Failed." He was associated for some time with Walcott Balestier and with him wrote "The Naulakha." After the death of his friend, he came to America and married his sister, Miss Balestier, residing for some time at Brattleboro, Vermont, where he wrote many short stories and verses. Kipling has been able to put many realistic scenes into his writings, and make them popular by picturesque phrases and a pleasing style. His best known works not named above include "Flag of England;" "Seven Seas;" "Jungle Books;" "McAndrews' Hymn;" "Captains Courageous;" "Day's Work;" "Barrack-Room Ballads," and "Absent-Minded Beggar."

RUDYARD KIPLING.

KIRKSVILLE (kẽrks'vĭl), county seat of Adair county, Missouri, about sixty-five miles southwest of Keokuk, Iowa. There are connections by several important railroad lines. It is surrounded by a fertile farming and dairying country, which also produces a considerable quantity of coal. The manufactures include woolen goods, furniture, wagons, farm machinery, and cheese. It has modern municipal facilities, and is the seat of the North Missouri Normal School. The city has a modern courthouse and several schools and churches. A. T. Still, the founder of osteopathy, long resided in Kirksville. Population, 1900, 5,966.

KIRKWOOD, Samuel Jordan, statesman and war-governor of Iowa, born in Harford county, Maryland, Dec. 20, 1813; died in Iowa City, Sept. 1, 1894. In 1835 he settled in Ohio, where he studied law, and in 1843 was admitted to the bar. In 1855 he settled in Iowa, where he served in the state senate, and in 1859 was elected governor as a republican. He was reëlected governor in 1861, and in 1866 became United States senator. In 1875 he was elected governor of Iowa a third time and in 1876 was re-elected to the senate. He resigned his seat in the senate in 1881 to enter the cabinet of President Garfield as secretary of the interior. Kirkwood attained a marked reputation

as one of the noted "war governors" and was likewise distinguished as a legislator.

KISS, August, celebrated sculptor, born near Pless, Germany, Oct. 11, 1802; died in Berlin, March 24, 1865. He secured training at the royal foundry in Gleiwitz and under the eminent sculptor Rauch. His first great work was a model of the celebrated group "Amazon and the Tiger," which was cast in bronze at a cost of $20,000, the amount being raised by public subscription. Among his other noted productions are "St. Michael Overthrowing the Dragons;" "Statue of Frederick the Great;" "Statue of St. George," and "Tiger Destroying a Serpent." The works of Kiss stimulated a taste for sculpture and aided materially in developing German art.

KLAMATHS (klä'maths), the name of several Indian tribes resident near the Klamath lakes of southern Oregon and northern California. They are naturally of a peaceable disposition, but vigorous when assailed, and have made material advancement in industrial arts. Extensive settlements in California by whites led to troubles in 1851, but peace was soon restored by treaty. They ceded a large tract of land to the United States in 1864, reserving a productive region of about 1,200 square miles, on which they conduct agriculture, lumbering, and trading.

KLEIST (klīst), **Heinrich von**, poet and playwright, born in Frankfort-on-the-Oder, Germany, Oct. 18, 1776; died Nov. 21, 1811. He served with distinction in the Prussian army against Napoleon, and after being imprisoned as a captive committed suicide. Kleist is celebrated as a writer and is recognized as a man of remarkable ability in poetic dramas. Interest in his production has been revived within recent years. His writings include "Family of Schroffenstein;" "Broken Vessel;" "Prince of Hamburg;" "Battle of Hermanns," and "Michael Kolhaas."

KLEPTOMANIA (klĕp-tō-mā'nĭ-ȧ), a species of insanity in which is displayed an irresistible desire or propensity to steal and hoard. In case of this affection it is held that the afflicted person, while not absolutely insane, is nevertheless unaccountable and his acts are not held criminal. The symptoms usually consist of peculiar motives in stealing and hoarding, peculiar judgment as to the character of the commodities taken, and a characteristic interest in many articles of little value.

KLONDIKE, a small tributary of the Yukon River, which has a general course toward the west, and flows into the Yukon near Dawson. Valuable deposits of gold were discovered in the region by George Carmack, a native of Illinois, in August, 1896, and subsequently the district became known as the Klondike region. This region is largely in Canada, but extends along the Yukon across the boundary into Alaska. In 1897 large numbers of prospectors and miners proceeded to the Klondike region, and in that year secured fully $2,000,000 in gold. Since then the work has progressed continuously during the summer season, and large quantities of the valuable mineral have been procured. The precious metal occurs largely in a free state in the form of nuggets and grains, and is separated from the gravel and dirt by washing. As a rule the washing is done in the summer season, but much of the pay-dirt is excavated from the frozen bed of muck at all times of the year.

KLOPSTOCK (klŏp'stok), **Friedrich Gottlieb**, author and poet, born in Quedlinburg, Germany, July 2, 1724; died March 14, 1803. His father was a public official in moderate circumstances, who exercised care in promoting his education. He studied in his native town, at Jena, and at the University of Leipsic. In 1746 he contributed to periodicals published at Leipsic, and also composed his epic poem, "Messias," which appeared in 1748. The high character of this work attracted general attention and established his reputation. He was a teacher in 1748-50, and in the latter year spent some time in Zurich. In 1771 he was given a pension by the Danish government, amounting to $300, and later received a pension and honorary title from the grand-duke of Baden. His writings exercised an influence for nationalism among the German states, and in a marked way counteracted French tendencies in the literary and social life of Germany. Among his productions are numerous contributions to "The Bremen Beitrage," and to several periodicals at Hamburg. His chief works include "The Death of Adam;" "Wingolf;" "Solomon," and "Odes." Many of his works have been widely translated, being popular for their dignity and lofty thought.

KNIGHTHOOD (nīt'hŏŏd), **Orders of**, a term applied to organized and constituted orders or bodies of knights. There are two classes of orders of knighthood, one constituting fraternal associations and the other honorary. The associations or fraternities possess property as independent bodies, to which class belongs the Hospitallers, Templars, and Teutonic Knights. Honorary associations were established by sovereigns within their own dominions, and embrace most of the orders now maintained in European countries, such as the orders of St. George, Golden Fleece, St. Michael, and Holy Ghost. The orders of the Garter, St. Patrick, the Thistle, St. George, and several others are British, and the Star of India is an order of India. Orders of knighthood in the different countries have each an appropriate insignia, with which is included a badge, ribbon, collar, jewel, and a star. The Normans first introduced knighthood into England as a feudal institution, but at present a knight holds a title of honor next below baronet. Since the 16th century it

has been considered a title of honor conferred as a reward for personal merit or for services rendered the crown or the country. The title carries with it the right to prefix sir to the Christian name, and the wife is legally called dame, though lady is by courtesy her designation. Knights who belong to no special order of knighthood are properly knights bachelor; those belonging to an order take the name of such order, as knight of the Garter and Bath. The rank is not hereditary. See **Chivalry.**

KNIGHTS OF LABOR, a fraternal labor association organized at Reading, Penn., in 1869. The object of the organization is to protect the laboring classes, ameliorate the condition of the workingman, and promote industrial interests. At present the membership is about 200,000. It constitutes one of the most intelligent associations of the wage-workers in the United States.

KNIGHTS OF PYTHIAS, a fraternal and benefit association organized in 1864, whose purpose is to exemplify true and noble friendship. It is based upon the friendship of Damon and Pythias, two celebrated Pythagoreans of ancient Syracuse. Dionysius the Elder, tyrant of Syracuse, had condemned Pythias to death, but permitted him to visit his wife and family once more on the condition that Damon take his place in suffering the penalty, in case Pythias should not return. The latter returned before the time set for the execution, which so impressed Dionysius that both were set free. The Knights of Pythias have been remarkably prosperous, and at present number 575,000 members in the United States. There are also representative organizations in several foreign countries.

KNOW-NOTHINGS, a name by which the members of the American party became known. This appellation was applied because the party was a secret organization, and when asked about its affairs the members professed to know nothing about the matters. Among its tenets were that naturalization should be granted only after twenty-one years' residence; that America should be governed only by Americans, and that allegiance to any foreign power should constitute a bar to selection for office. The party was organized for an active campaign in 1855, and that year carried the state elections of Kentucky, New York, California, and most of New England. Millard Fillmore was its candidate for president in 1856, and received 874,534 votes, but in the electoral college obtained only eight votes, those cast by the state of Maryland. After the election of 1856, the party became disorganized and its members largely went over to the newly organized republican party.

KNOX (nŏks), **Henry,** soldier and patriot, born in Boston, Mass., July 25, 1750; died at Thomaston, Maine, Oct. 25, 1806. At the age of eighteen years he began to train in a company of grenadiers, by whom he was chosen commander. His education was secured in a common school, after which he engaged as a bookseller, but his military ardor soon led him to join the army and labor actively in the interest of the oppressed colonies. At the battles of Bunker Hill, Trenton, Brandywine, Germantown, and Monmouth he rendered efficient services, and also during the siege of Yorktown. His earnestness won the special confidence and esteem of Washington. He was appointed secretary of war in 1775, and, when Washington became president, he again secured an appointment to the same position. In that capacity he exhibited rare ability and endeared himself to his countrymen. In 1794 he withdrew from public life and retired highly honored to a homestead on the Penobscot, in Maine. Subsequently he was chosen a member of the state legislature.

HENRY KNOX.

KNOX, John, reformer and clergyman, born near Haddington, Scotland, Nov. 24, 1505; died Nov. 24, 1572. He was educated in his native town and at the University of Glasgow, but left the university before completing the course. In 1542 he became an advocate of the reformed faith, and preached at the castle of St. Andrews to the Protestants. When St. Andrews was taken by the French, he was carried a prisoner to France, but at the solicitation of Edward VI. was released from captivity in 1549. The religious disturbances common to Scotland at that time made it unsafe for him, and he located at Frankfort-on-the-Main, Germany, and later at Geneva, preaching the Protestant faith and devoting his time to religious culture. He returned to Scotland in 1559, and there led the reform movement until his death. The unfortunate Mary Queen of Scots landed in Scotland in 1561. Two opposing parties formed quickly, in which Queen Mary and Knox were the principal opponents in relation to religious doctrines. The institution of mass in the royal chapel was the occasion of clear and forcible sermons by Knox, and, when the massacre of St. Bartholomew occurred in France, he again preached sermons that thrilled the Protestants with stronger sentiments against the Catholics supporting Mary. Though suffering from an apoplectic stroke, he continued his active work until shortly before his death. Knox possessed the faculty of a leader to a remarkable extent, was God-fearing, and stands in history as one of the most eminent early divines of Scotland. He wrote "Admonition of the Professors of God's

Faith in England;" "Confession of Faith;" "First Book of Discipline," and "History of the Reformation of Religion in Scotland."

KNOX, John Jay, financier and author, born in Knoxboro, New York, March 19, 1828; died in New York City, Feb. 9, 1892. He graduated from Hamilton College in 1849, entered the banking house of his father, and from 1857 to 1862 conducted a private banking business at St. Paul, Minnesota. In the latter year he was appointed chief of the mint by Secretary Chase, and in 1872 became comptroller of the currency. It was largely due to his influence that the partial demonetization of silver was effected in 1873 and the resumption of specie payments brought about in 1879. In 1884 he became president of the National Bank of the Republic in New York City. He published "History of the Various Issues of Paper Money by the United States."

KNOXVILLE, a city in Tennessee, county seat of Knox county, on the Holston River, and on several important railroad lines. The surrounding country produces vast quantities of coal, zinc, and marble. Among its manufactured products are flour, machinery, cotton and woolen goods, stoves, furniture, leather, soap, car wheels, and ironware. Besides being the seat of an excellent public school system, it contains the state agricultural college, University of Tennessee, Tennessee school for deaf mutes, East Tennessee asylum for the insane, and the Austin school for colored pupils. The city was occupied by a Union army of 12,000 men under General Burnside in November, 1863, and a siege was laid by Longstreet. Sherman's army was sent to relieve Burnside in the latter part of 1863, after which the Confederates were compelled to raise the siege. At present the city is the center of a large jobbing trade, has fine streets, electric street railways, and is improved with all modern municipal facilities. There is a growing trade in fruits, cereals, and merchandise. Population, 1900, 32,637.

KOALA (kō-ä'lä), or **Kangaroo Bear**, a bear or sloth native to Australia. It is a marsupial mammal, has a rudimentary tail, small head, ash-gray color, and feeds largely on the tender shoots of the blue-gum tree. The length of its body is about two feet, and its claws are well fitted to climb trees, in which it spends the greater portion of the time. Koalas live in pairs, are very tenacious of life, and the young are carried on the back of the mother when they have outgrown the marsupium.

KOCH (kōk), **Robert**, celebrated bacteriologist, born in Klausthal, Germany, Dec. 11, 1843. He graduated from Göttingen, where he received a degree in medicine, and soon after entered upon the practice in a town near Hanover and later at Wollstein. In 1881 he attracted general attention by his efficient expert testimony in a case of poisoning, and was appointed member of the sanitary commission at Berlin and professor of the school of medicine. The following year he announced the discovery that the existence of bacilli is the cause of tuberculous diseases, and soon after published the view that the bacillus tuberculosis is a specific germ causing those diseases. The German government dispatched him to Egypt and India in 1883 for the purpose of studying the causes and prevention of cholera. This led to the discovery of the microbe of cholera, which he found in the water of a cistern and named it Asiatica. On returning to Germany he became privy councilor, and was made rector of the Imperial Institute of Hygiene. In 1890 he announced that he had discovered a lymph by which the bacillus tuberculosis could be expelled from the human system without injury to the patient, and that its application to consumption would greatly relieve or cure patients. His services to mankind are of inestimable value, being alike important in the prevention and cure of diseases. In 1901-02 he was called to various countries to lecture on the theory of bacilli as related to food and diseases. Among his writings are "Researches Regarding Tuberculous Diseases;" "What our Physicians Know and are Able to Do;" "Remedies for the Cure of Tuberculosis," and "Diseases due to the Infection of Wounds."

ROBERT KOCH.

KOHINOOR (kō-ĭ-nōōr'), a famous diamond now owned by the crown of Great Britain. It was secured from India when the Punjab was annexed. Its value is about $600,000.

KOKOMO (kō'kō-mō), a city in Indiana, county seat of Howard county, fifty-four miles north of Indianapolis. It is important as a railroad center, has street railways, electric lights, pavements, and waterworks. There are manufactures of stoves, carriages, lumber products, flour, cigars, furniture, and machinery. The city has a modern courthouse, good public schools, and a number of fine churches and residences. Population, 1900, 10,609.

KONG MOUNTAINS, a West African mountain chain, stretching along the northeastern boundary of Liberia, and attaining to heights of about one mile above sea-level. In these mountains the Niger has its source, flowing from them toward the northeast. The district is populated by Mohammedans. It contains valuable timber and minerals. The slopes and valleys are highly fertile, producing grasses, cereals, and fruits.

KONIGGRATZ (kō'nĕg-rĕts), a fortified

town of Bohemia, situated on the Elbe River, seventy miles northeast of Prague. There are connections by railways and a considerable local trade. It is noted in history on account of an important battle between the German army of Prussia and the forces of Austria, which occurred July 3, 1866, and resulted in the defeat of the Austrians. As a consequence of the battle Prussia became the supreme power in the German states, Venice was ceded to Italy, and Hungary became constitutionally independent. The battle is more properly called Sadowa, from an adjoining town. Population of Königgratz, 18,350.

KONIGSBERG (kö'nĭgs-bĕrg), an important city and seaport of Germany. It is situated in East Prussia, on the Pregel River, about five miles from Frische Haff, an inlet from the Baltic Sea, 330 miles northeast of Berlin. The city was strongly fortified in 1626, but the modern defenses were built in 1843. There are extensive manufactures of machinery, clothing, earthenware, chemicals, and textiles. Its celebrated university dates from 1544, when it was founded as a Lutheran institution, and in 1844-65 it was rebuilt and enlarged. At present it has one hundred teachers, about 900 students, and a library of 225,000 volumes. Kant taught at the university nearly fifty years, and a beautiful monument was erected to him in 1864. Among the other famous teachers are Herbart, Bessel, Herder, Neumann, and Von Baer. There are many fine schools, seminaries, colleges, and churches. The city of Königsberg is conveniently connected by numerous railroads, and has an important navigation commerce by the Frische Haff. It contains many valuable buildings, beautiful streets, electric street railways, public parks, and several statues and monuments. Its cathedral is one of the finest in Europe. Frederick I. was crowned king of Prussia at Königsberg, and in 1861 similar ceremonies were celebrated when William I. ascended the throne. Population, 177,540.

KONIGSHUTTE (kö'nĭgs-hüt-tę), a city of Germany, in the province of Silesia. It is extensively connected by railroads, has electric railways, pavements, and several fine schools. In its vicinity are vast coal, iron, and zinc mines. The manufactures include ironware, machinery, and clothing. Population, 38,360.

KOORDISTAN (kōōr-dĭs-tän'), or **Kurdistan**, a region of eastern Turkey in Asia, including an area of about 80,000 square miles. Its northern boundary is formed by Armenia and eastern by Persia, extending into the latter country as far as Lake Urumiah. The inhabitants are principally Kurds, who adhere to the Mohammedan religion, but differ from the Turks in language. The Kurds are largely fanatical in their religious views, extremists in government, and a portion follow a pastoral life. They have been a source of strength to the Turks against the Armenians, but have opposed the spread of Turkish customs and language. The entire population is estimated at 2,750,000.

KOOTENAIS, or **Flatbows**, a North American Indian tribe, resident in Montana, Washington, and British Columbia. Their chief seat in British Columbia is in the vicinity of Lake Flatbow. They support themselves mostly by hunting and fishing. The Kootenais are peaceable and quite industrious.

KORAN (kō'rạn), the book containing the sacred scriptures of the Mohammedan religion. It is made the basis of all civil, military, and social transactions among the Moslems. The name is usually written Al Koran, that is The Koran, meaning originally "The reading," or "That which is to be read." The Mohammedans teach that the book is coeval with God, having existed eternally. In the beginning of time the transcript was made in rays of light upon gigantic tablets that were situated in the highest heavens, near the throne of the Almighty, and that the angel Gabriel communicated the different portions to Mohammed within a period of twenty-three years, both at Mecca and Medina. Mohammed dictated the Koran in manuscripts to a scribe, who preserved them in written form for the followers of the faith. At first the different portions appeared without definite arrangement, but, after the death of Mohammed, Abu Bekr directed Zaid Ibn Thabit of Medina to collect them into a volume. Later this edition was revised by Caliph Othman, and in the thirtieth year of the Hegira, the year 652 A. D., it was published. This revision contains 114 chapters, and at the head of each a title indicates the nature of its contents, these often being strange-sounding, including such as: The Cow, The Star, The Towers, The Poets, etc. The chapters begin with the introduction: "In the name of God the Merciful, the Compassionate."

Among the tenets taught in the Koran are that there is but one God, and he is all-wise, merciful, and everlasting; that there is a punishment for the wicked and a reward for the just, and that all peoples will go to their reward at the day of judgment. Christ is assigned a place in the highest or seventh heaven, where he lives in the presence of God. When mankind becomes wayward and forsakes the path of righteousness, prophets are sent to direct them toward the true God. Among the prophets sent to earth are Adam, Noah, Abraham, Moses, Jesus, and Mohammed, the last named being the greatest of all the prophets. It teaches also the doctrine of good and bad angels, outlines severe condemnation for the idolatrous, and describes heaven as a place in which seven degrees of award for righteousness will be made, these being called first, second, third, etc., heaven, and ranging from entertainment by music to the supreme joy of meeting

God face to face. The decrees of God are held to be unchangeable; the doctrine of predestination is taught, and all are admonished to fast, give alms, repeat prayers, and go on pilgrimages to Mecca and Mt. Ararat. In praying it is advised that five prayers be said a day, during which the face is to be turned toward Mecca. When ready for prayer, it is necessary to perform the act of purification, which consists of bathing the hands, for which purpose sand or dry dust may be used where water is not obtainable. The laws of Moses and the decrees of Jewish rabbis are adhered to in the treatment of divorce, polygamy, inheritance, and other practices. In language the Koran is elegant and pure, and is considered the ideal production of Arabic classics, while no human being is thought to be capable of producing its equal. In size the Koran is about the same as the New Testament, the work containing 77,639 words. There are innumerable commentaries on the Koran. It is claimed that the Tripoli library in Syria at one time contained fully 20,000 different treatises.

KOREA. See **Corea.**

KOSCIUSKO (kŏs-ĭ-ŭs'kō), **Mount,** one of the most elevated mountain peaks of Australia, situated in the Muniong Alps, in New South Wales. It has a height of 7,308 feet above sea-level.

KOSCIUSKO (kos-sĭ-us'ko), **Thaddeus,** Polish general and patriot, born in the province of Minsk, western Russia, Feb. 12, 1746; died Oct. 15, 1817. He descended from a wealthy family of Lithuania, was educated at the military school at Warsaw, and later completed his education in France. After returning to Poland, he became tutor to the daughter of Gosnobski, marshal of Lithuania. In 1776 he came to America and rendered valuable aid to the colonists in the Revolutionary War, rising in rank to brigadier-general. He returned to Europe in 1786, and in 1794 was appointed general of the insurgent army of Poland in the war against Russia, having previously served with distinction at Dubienka. As commander-in-chief and dictator he led the insurgent forces against the Russian troops at Raclawice, near Cracow, and there obtained a brilliant victory. Subsequently the Poles in Warsaw joined the insurrection, after which he organized a provisional government and effectually resisted the united Prussian and Russian army for months. His army consisted of 20,000 regular troops and 40,000 peasants, the whole being about one-third that of the allied army, but with these he was able to hold Warsaw, and even compelled the enemy to raise the siege laid to that city. At last he was overpowered by superior forces in the battle of Maciejovice, on Oct. 10, 1794, and, after being wounded, was taken prisoner. The Russians confined him at St. Petersburg until after the death of the Empress Catharine, but he was restored to liberty on the accession of Paul I., in 1796.

THADDEUS KOSCIUSKO.

At the time of liberation Kosciusko was offered an estate with 1,500 peasants, which he accepted for a brief period, but later resigned the estate and visited the United States, where he was accorded distinguished honors. Congress granted him a pension and also gave him a tract of land. In 1806 Napoleon proposed a plan to restore Poland, but Kosciusko was restrained by a promise to Emperor Paul from taking an active part in the enterprise. However, in 1814 he entreated Emperor Alexander to grant amnesty to the Poles in foreign countries, and three years later released from servitude the peasants on his own estate in Poland. The closing years of his life were spent in France and Switzerland, his death occurring in the latter country at Solothurn from an accident while riding a horse. The remains were taken to Cracow in 1818 at the expense of Emperor Alexander of Russia, and a monument was erected to his honor.

KOSSUTH (kŏsh'o͞ot), **Louis,** distinguished patriot, born at Monok, Hungary, April 27, 1802; died in Turin, Italy, March 20, 1894. He descended from a family of noble rank, studied law at the Protestant college of Sarospatok, and engaged in its practice at Pesth. In 1832 he became a member of the diet at Presburg as proxy of a member of the upper house. Soon after he began the publication of a liberal paper at Pesth, but it was suppressed by the government. On account of taking a position favorable to six patriots who had been illegally imprisoned, he was arrested for treason in 1837, and after trial condemned to four years' imprisonment. The liberals in the diet insisted upon his release and refused to vote supplies to the government, causing him to be liberated after eighteen months' confinement. He founded the "Pesti Hirlap" in 1841. This publication met with much political and financial success because of its advanced views in government. In 1847 he was elected a deputy to the diet, where he soon became a prominent leader of the reform forces. Among the demands made

LOUIS KOSSUTH.

by him were that feudal privileges be abolished and the press made free, and, after the French revolution of 1848, an independent government for Hungary was demanded.

The national assembly of 1849 was induced by the influence of Kossuth to declare that all rights to the throne had been forfeited by the Hapsburg dynasty, and he was given an appointment as provisional governor of Hungary. However, this movement failed for want of European support, and because of a defeat at Temesvan, Aug. 9, 1849, when he resigned as dictator in favor of Görgey, and soon after fled to Turkey. There he was made a prisoner, but was liberated in 1851 and soon after visited the United States. While in America he spoke before large and enthusiastic audiences in favor of Hungarian independence, and was shown distinct marks of approval in behalf of his cause. He returned to Europe in 1852, making his residence in England until the Italian war of 1859 against Austria began, when his hopes of Hungarian independence were revived anew. However, he was disappointed in the speedy peace concluded at Villafranca. After the war he resided principally at Turin, where he devoted his attention to scientific research, and refused to return to his native land after the amnesty of 1867 was announced, declaring his continuous opposition to taking allegiance by oath. Many of his writings and addresses have been published in various languages besides the Hungarian, among them the French, German, and English.

KOVNO (kŏv'nō), a city in Russia, capital of the government of Kovno, situated near the junction of the Vilia and Niemen rivers, and important as a railroad and commercial city. It was founded in the 10th century, and for many years was the scene of military contentions between the Poles and German knights. The inhabitants include a large number of Jews. There are manufactures of beet-sugar, clothing, earthenware, and machinery. Population, 61,120.

KREMENTCHUG (krĕm-ĕnt-shōōg'), a city in the government of Poltava, Russia, situated on the Dnieper River, about sixty-eight miles southwest of the city of Poltava. It has extensive railroad connections. There is a considerable trade in tallow, salt, and timber. The manufactures include machinery, beet-sugar, furniture, and fabrics. A large tubular railway bridge crosses the Dnieper. Its municipal facilities are modern, including electric railways, sewerage, and waterworks. Population, 60,210.

KRISHNA (krĭsh'nä), in Hindu mythology, the eighth incarnation of the Brahmanic god Vishnu, and the most popular deity in the Pantheon of the Hindus. He is the hero of the greatest Sanskrit poem. His life history is similar to that of Hercules and Apollo.

KRONSTADT (krōn'stät), an important seaport of Russia, situated on the island of Koblan, twenty miles west of St. Petersburg. It is strongly fortified and serves as a strategic military protection to the national capital. The city is thought to be almost impregnable, being defended by strong granite forts and armed with heavy guns. Peter the Great founded it in 1710, but it has since been improved greatly. The present city has regularly platted streets, valuable churches, a thoroughly organized school system, and is equipped with modern facilities. Its harbor is safe and large. There are manufactures of ships, cannon, clothing, machinery, and various implements of war. Population, 49,150.

KRONSTADT, a commercial city of Austria, in the Saxon division of Transylvania. It is conveniently connected by railways, and is noted for its manufacturing and commercial trade. There are electric street railways, waterworks, and public parks. It is surrounded by a mountainous country, which is well wooded and rich in minerals. The inhabitants are mostly Germans. Population, 32,510.

KRUGER, Stephen John Paul, president of the Transvaal Republic, born in Rastenburg, Cape Colony, Oct. 10, 1825. He accompanied the Boers into Natal, later into the Orange country, and when fourteen years of age crossed the Vaal River. His early life was devoted to the development of the country, for which purpose he often aided in its defense. In 1872 he was elected a member of the executive committee of the South African Republic, and later general in the army. On February 27, 1881, he fought against the British and aided in their defeat at Majuba Hill, being commander-in-chief. He was first elected president of the republic in 1883, and, on account of distinguished ability, was reëlected in 1888, in 1893, and in 1898. Both in statesmanship and diplomacy he exhibited recognized ability, and secured a world-wide reputation for strong individuality, remarkable resources, and a devotion to liberty in government. Being foremost as a defender of independence, he led the Boers in a characteristic defense against British oppression, and in the war of 1899-1901 the army of the republic and that of the Orange Free State gave to the world examples of heroic bravery never surpassed. Being pressed by British advances, he left Pretoria, and on Oct. 19, 1900, sailed for Europe, where he was received with marked enthusiasm by

PAUL KRUGER.

the people. After visiting various countries, he made The Hague his chief residence.

KRUPP (krōōp), **Alfred**, celebrated gun manufacturer, born in Essen, Germany, April 26, 1812; died July 14, 1887. His father, Friedrich Krupp, discovered the art of making cast-steel, and when Alfred was fourteen years of age his father died. A small forge and shop was left for the support of his family. At the time Alfred took charge of it, in 1848, he employed two workmen. Soon after he discovered a method of casting steel in large masses, and erected the first forging hammer employed in Germany. Shortly after the manufactory became one of the most important in Europe and produced engines, rails, car wheels tires, and steel guns. The guns manufactured there were used in the Franco-Prussian War, giving the German army a decided advantage, especially at the siege of Paris. By 1875 the principal powers of Europe and of other grand divisions began to adopt the Krupp steel guns, and at present they are used more extensively than any others. In 1890 the factory cast a gun for the Russian government weighing 135 tons, and in 1893 exhibited one at the Chicago Columbian Exposition weighing 124 tons. Besides the extensive manufactory, Krupp acquired large mines and collieries, and at present 22,000 workmen are employed, while the manufactory covers an area of over 1,000 acres. The coal mines are in Essen and Bochum, while iron mines belonging to the institution are situated in Germany and Spain. The entire concern is by far the greatest of its kind in the world, and is only entered by workmen, all others and foreign governments being denied permission to inspect the premises. Alfred Krupp, son of the founder, succeeded to the general management after the death of his father. In 1864 letters of nobility were tendered Krupp by the king of Prussia, which he declined. He was one of the wealthiest men of Germany, philanthropic, and at his death 60,000 people gathered at Essen to pay their last respects. The son died Nov. 22, 1902.

ALFRED KRUPP, SR.

KUBLAI-KHAN (koo'bli-kän'), Mongol emperor of China, founder of the twentieth dynasty, that of the Mongols of Yuen, born in Tartary in the early part of the 13th century; died at Pekin in 1294. He was the reigning sovereign of Tartary in 1250, and formed an alliance with Li-Sung, emperor of China, for the purpose of expelling the Oriental Tartars from the latter country. After the incursionists were subdued and expelled, his army remained in China, and he became emperor of that country after the death of Li-Sung, about 1260. Marco Polo, a celebrated European traveler, lived at the court of this prince, and to him we are indebted for a description of his palaces, internal improvements, public revenues, hunting expeditions, and the splendor of his court. The Li-Sung dynasty was not only overthrown, but Java, Burmah, Corea, Cochin-China, and portions of India were compelled to recognize his supremacy. At that time the Buddhist religion was made official in the state, and the government, both internally and with respect to its foreign policy, was eminently successful. In the latter part of his reign he made the grand dukes of Russia tributary, sent an expedition against Japan, and conquered Manchuria. The poet Coleridge made him the subject of several poems.

KU-KLUX-KLAN, a society founded at Pulaski, Tennessee, in 1866, in the reconstruction period that followed the Civil War. At first the purposes of the society were for amusement, but later it took on the object of opposing the reconstruction acts and preventing freedmen from voting. In some cases the Negroes were persecuted, prevented from voting, and even acts of violence were perpetrated upon them. The organization in the period of its greatest strength numbered about 550,000 members, all of whom were people of the southern states, but its largest membership was in Mississippi, South Carolina, Georgia, Tennessee, Alabama, and Kentucky. An act of congress passed April 20, 1871, provided suppressive measures and the society disbanded.

KUMAMOTO (kōō-mä-mō'tō), a city of Japan, situated near the western shore of the island of Kiushiu, on the Shira River. It is the capital of the Kumamoto district, is strongly fortified, and has an extensive interior and foreign trade. Its municipal facilities are modern, including waterworks, sewerage, and rapid transit. It is an educational center and is reached by steamers. Population, 55,210.

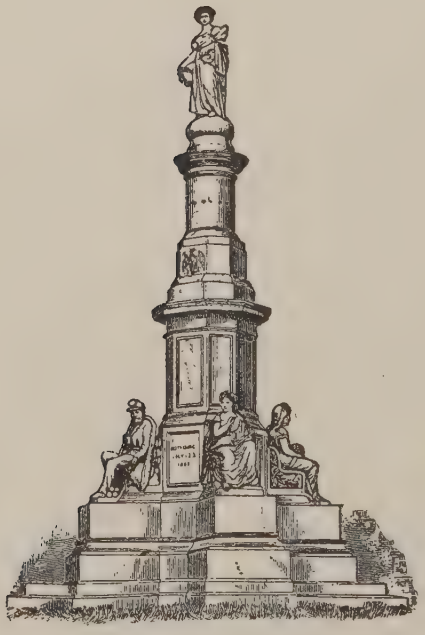
KURDISTAN. See **Koordistan**.

KURO SIVO, or **Japan Current**, a warm equatorial current formed in the region southeast of Asia. It flows past Formosa, Japan, the Aleutian Islands, and thence passes southward to California. Though important in commerce and in the modification of climate, it is inferior to the Gulf Stream.

KUSKOKWIM (kŭs'kọ-kwim), an important river of Alaska, the second in size of that territory. It rises on the north side of the Alaskan mountains, has a general direction toward the southwest, and after a course of 500 miles flows into Kuskokwim Bay, an inlet from Bering Sea. Its channel is irregular and bound by precipitous rocks, and about 300 miles are navigable.

KYOTO (kē-ō'tō), or **Kioto**, an important

city of Japan, situated on the island of Nippon, and connected with other trade centers by important railroad lines. The surrounding country is fertile, and about six miles from the city is Lake Biwa. For many years it served as the official residence of the mikado and was the ecclesiastical capital. At present it is a center of learning, contains many excellent educational and other buildings, and has divers modern facilities. There are street railways, electric lights, telephones, and public parks. As a commercial center it ranks among the first of Japan, both in exports and imports. Among the manufactures are silks, clothing, lacquered ware, ivory ornaments, machinery, bronze ornaments, and textiles. Population, 941,370.



SOLDIERS' MONUMENT GETTYSBURG.

L

L, a letter of the Indo-European alphabet, the ninth consonant. In the English l has only one sound, and is usually classed as a semi-vowel or a liquid. It is made by raising the tip of the tongue to the d position, and the sonant breath is passed through openings on both sides with a thrill or rustle. The letters l and r are more closely allied than any others associated with l, and the two are often interchanged in various languages. It is considered that l is a later modification of r in the Indo-European alphabet, r often changing to l, while d also takes the place of l in some of the languages.

LAALAND (lä'länd), an island in the Baltic Sea, belonging to Denmark. It is thirty-six miles long, about twelve wide, and has an area of 465 square miles. The soil is fertile, producing corn, hops, hemp, and fruit. There are about fifty square miles of oak and beech forests. Maribo is the capital, and Nakskov the largest city. The population is 66,380.

LABLACHE (lä-bläsh'), **Luigi**, operatic singer, born in Naples, Italy, Dec. 6, 1794; died there, Jan. 23, 1858. He appeared as a basso singer at the San Carlo Theater of his native city in 1812, and later attained a reputation by appearing at Palermo, Milan, Rome, Turin, and Vienna. In 1830 he sang successfully at Paris, and later at Berlin and St. Petersburg. While at London he gave instruction in singing to Queen Victoria. His voice was a deep bass and has rarely been equaled, either in quality or volume.

LABOR, the voluntary effort put forth by man to secure some desired object, and together with land and capital constitutes an important factor in the production of wealth. Land, labor, and capital are the three agents of production, but, since labor is the basis of all wealth, it may be regarded the most important factor in economic science. Nature and man are the two great agencies that coöperate in production, nature furnishing the material upon which labor is to be exerted, and man supplying the necessary labor to render the materials of nature available for useful purposes. Labor includes not only muscular exertion, but all the mental effort involved in securing objects of desire. It does not create, but moves and affects changes upon things. By bringing the natural forces to the service of man, and moving materials and objects into positions where forces can act upon them with the desired effect, labor effects its chief productiveness. The direct changes affected by it are transmutation, transformation, and transportation; or, a change of elements, a change of form, and a change of place. These are exemplified by the agriculturist in the production of cereals, fruits, and cheese; by the manufacturer in transforming leather into shoes, cloth into garments, and lumber into houses; and by the transporter, who transfers the production of one community to a locality where it is consumed. Labor is productive or unproductive, depending upon the results that accrue. Productive labor is that form which increases wealth or adds to human intelligence, happiness, or morality; while unproductive labor includes the misdirected, such as is exemplified by failures in speculative projects and by most wars.

In ancient times labor was largely compulsory, such as was applied in the building of the Egyptian pyramids and the wall of China. Through almost the entire history of the world the laboring man has been suppressed more or less in his activities by potentates or men of great wealth, but with the concentration of labor in manufacturing centers powerful efforts began to be exerted for the protection and amelioration of the laborer. The first organizations of this character were formed in the early part of the 18th century, and through all of the last century educational organization tended to render the laboring man more intelligent and efficient. He has come to be an important factor in the government, influencing legislation by the election of such men as are friendly to the interests for which the labor unions stand. The Knights of Labor and American Federation of Labor are the strongest organizations, but there are many others, among them the powerful organizations supported by miners, railroad workers, employees of manufactories, and those engaged in transportation enterprises. Legislation favorable to the interests of labor has been promoted in all the states, and for that matter in all the civilized nations of the world. This organization on the part of laborers has been a source of much benefit to the material industries, aiding in production as well as benefiting the laborer intellectually and financially. The most important objects of the labor movement of recent times embrace the compulsory arbitration of differences between employers and employees, and the establishment of the eight-hour system of labor.

LABOR, American Federation of, a national organization formed in 1886 by trades-union societies of the United States. This powerful association of organizations embraces the most influential ever formed in

America. It represents 7,125 local unions and a membership of 710,000.

LABOR DAY, a legal holiday in many civilized countries. In the United States it occurs on the first Monday in September, and in Europe quite generally on May 1. Labor Day was first celebrated in a few states in 1886, but since then it has grown in favor, and in many portions of the country constitutes a holiday of much importance. The celebration includes parades on the streets by industrial unions, music, speeches relating to labor interests, various games, and often fireworks in the evening.

LABOUCHERE (läh-boo-shêr'), **Henry**, journalist and politician, born in London, England, in 1831. He studied at Eton, entered the diplomatic service in 1854 and was attached to several embassies, including those at Washington, Dresden, Stockholm, St. Petersburg, and Constantinople. In 1865 he secured an election to parliament for Windsor, was reëlected in 1867, and the following year traveled abroad. During the Franco-Prussian War he was correspondent to the "London Daily News," and sent reports from Paris during the siege by means of carrier pigeons. He was again elected to parliament in 1880, supporting Gladstone in his Irish policy. In 1877 he founded a society paper called "Truth," and also held a proprietary interest in the "Daily News."

LABOULAYE (lä-boo-lā'), **Edouard Rene de**, jurist and author, born in Paris, France, Jan. 18, 1811; died in Versailles, May 25, 1883. He first became a typefounder, when twenty years of age published "History of Landed Property in Europe," and in 1842 was admitted to the bar. Seven years later he was chosen professor of comparative legislation in the College of France. In 1871 he was elected to the national assembly, became a life senator in 1875, and the following year was appointed administrator of the College of France. As a lecturer and writer he opposed the despotism of Napoleon III., and advocated the adoption of a constitution for France similar to that of the United States. His writings embrace "United States and France;" "History of the United States;" "Germany and the Slavic States," and "Memoirs of Franklin."

LABRADOR (lăb-ra-dôr'), a British possession of North America, situated northeast of Quebec, and forming a dependency of Newfoundland. It extends from Quebec to Hudson Strait, is bounded on the west by the Dominion of Canada and the east by the Atlantic, and contains an area of about 56,000 square miles. Its surface is greatly diversified, portions being desolate and rocky, while in some localities are extensive forests of birch and fir trees. Among the principal streams are the Grand and Northwest rivers, and in the southern portion is Lake Aswanipi, or Hamilton, which discharges by the Northwest River. The western and northern coasts are indented by a number of bays, of which Hamilton Inlet and Ugava Bay are most important. Its inland waters and coast regions abound with whitefish and salmon, while the interior contains many valuable fur-bearing animals, among them the otter, marten, fox, bear, wolf, reindeer, and beaver. The winter season is of nine months' duration and very cold; the summer is moderately warm and adapted to the culture of potatoes and other forms of vegetables, while such cereals as barley and oats are cut for fodder. This region was visited by the Norsemen in the year 1001, by Cabot in 1498, and by a Portuguese expedition under Cortereal in 1500. At present the total resident population is 4,490, including 625 Indians, but during the summer months there are fully 30,000 who come annually to engage in fishing. The name Labrador was given to the region by the Portuguese, meaning Laborers' Land, and is frequently applied to the entire peninsula between the St. Lawrence and Hudson Bay.

LABRADORITE (lăb'ra-dôr-īt), a mineral formerly called Labrador hornblende, and found on the coast of Labrador. The colors are commonly blue and green, and its formation a lime-soda feldspar. It forms an essential constituent of many rocks, being associated with augite, hornblende, and other mineral substances, and serves a useful purpose for inlaid work and jewelry.

LABYRINTH (lăb'ĭ-rĭnth), a building containing tortuous passageways, which are difficult to traverse without guidance. Many buildings of this character were constructed anciently, notably those of Egypt and Crete. The labyrinth of Crete, according to legendry, contained passages from which no one could escape; thus visitors became the prey of Minotaur. It was reputed to have been built by King Minos. The only safeguard was to be provided with a linen thread, and in following this it was possible to make the exit. This celebrated labyrinth was situated in the district now called Fayoun, contained 3,000 chambers, and is classed as a wonder of the world. Other celebrated labyrinths were at Clusium, Italy, and in Samos and Lemnos. Mazes are imitations of labyrinths, and are fashionable in gardens and at expositions. The maze at Hampton Court, in England, is a good example in gardening, while the mystic maze exhibited at the Columbian Exposition, in 1893, was a fine example of a mirror structure.

LAC, a resinous substance exuding from an East Indian scale insect called coccus, but also occurring in Siam, Burmah, China, and other Asiatic countries. It consists of a granular substance forming cells for the shelter of the eggs of the insects, and incrusting the young in the branches of different species of trees. After the eggs are laid, the mother dies, and when the

young come out they secrete the lac. The females contain a red fluid useful in making crimson and scarlet dyes, which is quite similar to the coloring matter of the cochineal. In some portions of India the lac insect is cultivated, both for its lac and dye properties. When in a natural state the product is called stick-lac; when crushed and washed, seed-lac, and when transformed into a thin crust by melting, shell-lac. Lac is used in the manufacture of lacquer, varnish, sealing-wax, and for materials to stiffen various articles of apparel, such as the calico frame of silk hats. Lac-dye colors a beautiful scarlet and is an important article of commerce.

LACE, a delicate fabric or network of threads formed of linen, cotton, silk, gold, silver wire, or other suitable material, forming a fabric of transparent texture. The origin of lace is unknown, but it was used by the ladies of ancient Greece and Rome. In Italy the manufacture of lace was an important industry during the Middle Ages, was thence introduced into France, and a law passed in England in 1483 prohibited its importation, but in the 16th century its production became quite extensive in western Europe. Brussels, Alencon, and Maltese are among the best known point laces, and were produced extensively in Belgium and France for many centuries. In the 16th century lace manufactories were established at Honiton, England, and at North Hampton in the 17th century, and in 1768 a machine for manufacturing lace was produced in the latter place.

There are a number of different laces, depending upon the mode of manufacture and the purposes for which they are to be used. The finest laces are hand-made, these excelling in strength, delicacy, and beauty, and also commanding the highest prices. No branch of the textile industry has received more attention than that of lace manufacture, and it is one of the industries in which machine work does not compete with the fineness of hand-made products. Pillow-lace is made largely by hand, but there are varieties produced wholly by machinery. In lace-weaving the threads of the weft are twisted around those of the warp. The character of the net and its name are determined by the manner of twisting, as pattern-net, spider-net, bobbin-net, Paris-net, and whip-net. Point lace was developed from embroidery, and is made largely by needle and single thread. Guipure lace is made by the crochet-needle, and has a network ground on which patterns are wrought in various stitches in silk. The manufacture of gold and silver lace is associated with the ribbon trade. It has for a basis thin ribbons or flat bands, around which yellow and white threads of cotton are wrapped closely. In the lace industry France takes a very high position, no less than 250,000 persons being engaged in its manufacture in that country. Machine-made imitations of the finer laces are commanding a large sale and taking the place of the more expensive forms.

LACHLAN, a river of New South Wales, Australia. It rises in the Blue Mountains and has a length of 700 miles. Near Nap Napo it joins the Murrambidgee, belonging to the Murray River system.

LACKAWANNA (lăk-a-wŏn'a), a river of Pennsylvania, rises in Susquehanna county, and after a course of forty miles joins the Susquehanna near Pittston. The valley and basin of the Lackawanna River are productive coal regions, and produce about one-half the anthracite coal obtained in the United States.

LACONIA (la-kō'ne-a), county seat of Belknap county, New Hampshire, about twenty-five miles north of Concord, on Lake Winnisquam. It is an important railroad town, has good schools, and manufactures hosiery, machinery, railroad cars, woolen goods, and hardware. Electric lights, waterworks, and street railways are among the improvements. Population, 1900, 8,042.

LACQUER (lăk'ẽr), a varnish composed of shellac dissolved in alcohol, and colored with various substances, such as saffron, gamboge, and annato. It serves as a protection from rust and improves the color of metals, especially brass, tin plate, and iron. Lacquer also is applied to wood and papier-maché for the purpose of giving improvement in color. The lacquered ware manufactured by the Japanese and Chinese is varnished by a product made from the juice of a species of sumac, called the varnish tree, which is native to that region of Asia. Vermilion is used in mixing this varnish for the purpose of making a reddish color, and different hues are secured by various other substances. The lacquer made from the sumac not only gives a firm surface, but is able to withstand considerable heat without damage, and it is due to this property that the lacquered vessels from those countries may be used to contain hot drinks and soups. Lacquering among the Japanese is an ancient art, and many of their designs are of much value, especially the specimens that were made by them in former centuries. Their process of manufacturing silver and gold lacquer ware is among the finest now produced.

LA CROSSE (la-krôs'), a city in Wisconsin, county seat of La Crosse county, at the junction of the La Crosse and Mississippi rivers. It is the focus of several railroads, giving it excellent advantages commercially. The manufactories represent a capital of $12,000,000, and produce woodenware, flour, farming machinery, cigars, spirituous beverages, clothing, ironware, and lumber. Its grain and lumber trade is extensive. There are excellent facilities, including street railways, electric lights, pavements, public parks, and a library of 18,500 volumes. The

city has many fine schools, a modern courthouse, about fifty churches, and is noted as a center of educational enterprise. Population, 1900, 28,895.

LACROSSE, a game at ball that originated with the Canadian Indians. It is played similarly to football, differing from

LADYBIRD (magnified).

it in that the players endeavor to carry or throw the ball to their opponents' goal on a peculiar bat called crosse. The bat consists of a long staff, covered at the end, and having network reaching about halfway, becoming narrower as it approaches the hand. In 1867 the National Lacrosse Association of Canada was organized, and the game has been steadily gaining in popularity.

LACTEALS (lăk'tē-*alz*), the fine lymphatic tubes that take up fat from the intestines, and named in 1622 from their discoverer, Gasparo Asselli (1580-1626). They commence on the surface of the intestines, and during digestion can be seen as milky lines across the mesentery. After a full meal, they convey a fluid milky in appearance, called chyle, and during intervals of fasting convey a yellowish lymph.

LACTOMETER (lăk-tŏm'ē-tēr), or **Galactometer**, an instrument to ascertain the comparative specific gravity and value of different samples of milk. There are several varieties of instruments belonging to this class; the one in common use consists of a glass tube, about twelve inches long, and graduated into one hundred parts. The instrument is filled with fresh milk, and, after the cream has been fully separated, its value is determined according to the graduated scale by the number of parts it occupies in the tube.

LADOGA (lăd'ō-gą), an extensive lake of northern Russia, situated northeast of St. Petersburg. It is the largest inland lake of Europe; has a length of 128 miles; breadth, seventy-eight miles, and an area of 7,115 square miles. Into it flow the waters from Lakes Ilmen, Onega, and Saima. It contains a number of rocky islands, the most important being Konevetz and Valaam, the two having an area of about 215 square miles. The lake is important on account of its fisheries, navigation facilities, and connection by several canals. Its discharge is by the Neva River into the Gulf of Finland.

LADRONES (lą-drōnz'), or **Marianne Islands**, a group of islands situated in the Pacific Ocean, east of the Philippines and north of the Carolines. The group includes sixteen separate islands, of which Rota, Tinian, Saypan, and Guam are the most important. The area of the entire group is 418 square miles. They were discovered by Magellan in 1521, and were in the possession of Spain up to 1898, when Guam was ceded to the United States, and the remainder of the Ladrones, together with the Caroline and Pelew groups, were sold to Germany in 1899 for $4,825,000. At the time of their discovery they possessed a population of 60,000. However, at present the entire population is only about 10,500, of which the principal portion is on the island of Guam. The inhabitants were originally Chamorros, but are now constituted largely of Tagalas, and allied to those constituting the chief inhabitants of Luzon. Properly the Ladrone Islands are divided into two groups, the northern of which is actively volcanic, while the southern group contains a greater area of fertile soil, though both have timber and tillable land. Agriculture and commerce are the principal industries, but neither is important. The climate is cooler than that of the Philippines and is quite healthful.

LADYBIRD, a class of small insects or beetles found commonly on plants and trees. They are noted for their various colors, such as yellow, red, and black and white variegated. The body is spherical, flat at the lower surface, and legs and head are small. There are various species, and all are of utility in destroying plant lice. The eggs are laid on the under side of leaves. Both

LADY'S SLIPPER.

the larvæ and the adults feed on plant lice, but also deprive vegetation of some of its juices.

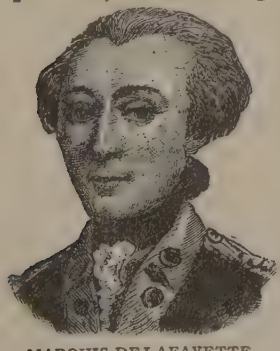
LADY'S SLIPPER, a genus of beautiful orchids native to the northern latitudes,

three species occurring in the United States. The roots of the yellow lady's slipper yield medicine of value in cases of nervous affection. Most species bear beautiful flowers, which have a lip about two inches long, this being beautifully veined with rose purple.

LA FARGE (lä-farzh'), **John**, artist, born in New York City, March 31, 1835. He studied in New York and Paris, first devoting his attention to drafting on wood, and later to the painting of landscapes, portraits, and flowers. In 1869 he was elected a member of the National Academy, and in 1889 received a first-class medal at the Paris Exposition for excellent specimens of stained-glass. Soon after he was made a knight of the Legion of Honor. His finest productions include "St. Paul at Athens;" "View Over Newport," and "New England Pasture Land." He also executed decorative paintings in St. Thomas' Church and the Church of the Ascension, New York; Trinity Church, Boston, and the battle-window in Memorial Hall, Harvard University.

LAFAYETTE (lä-fā-ĕt'), a city in Indiana, county seat of Tippecanoe county, on the Wabash River, sixty miles northwest of Indianapolis. There are extensive railroad and steamboat facilities, making it important as a trade center. It was settled in 1811, shortly after the battle fought by General Harrison on the Wabash River, and was named in honor of General Lafayette. There are well paved streets, electric street railways, gas and electric lights, and a public library. It is the seat of Purdue University, an agricultural college founded by John Purdue, who donated $150,000. The manufactures embrace carpets, safes, knit goods, flour, carriages, machinery, bicycles, and cooper products. The surrounding country is agricultural and dairying. Lafayette has an important jobbing trade, and is a grain and live-stock market. Population, 1900, 18,116.

LAFAYETTE (lä-fā-yĕt'), **Marie Jean Paul Roch Yves Gilbert Montier, Marquis de**, celebrated general, born in Auvergne, France, Sept. 6, 1757; died in Paris, May 20, 1834. He was a page to the queen of Louis XV. when a boy, at sixteen married, and, when the American Revolution excited the sympathy of many high-spirited Frenchmen, he was one of the most friendly to American independence. In April, 1777, he sailed from Bordeaux to aid the Americans in a vessel equipped at his own expense, with the nominal disapproval of France. He landed in South Carolina and thence proceeded northward, receiving an appointment as major-general in July, and became an intimate friend of Washington. At the battle of Brandywine he was wounded, but served at Monmouth and in the Rhode Island campaign, and returned to France in 1779 because of the war with England. However, before the close of the year he returned to America, and was a member of the board of judges in the trial of Major André. In 1781 he commanded in Virginia against Arnold and Cornwallis, and returned to France after the close of the war, but made a brief visit to America in 1784, when he was received by the American people with marks of great distinction.



MARQUIS DE LAFAYETTE.

When the Revolution began in France, Lafayette became a prominent factor. and in 1789 introduced in the assembly the celebrated declaration of rights, a document modeled after the Declaration of Independence. Soon after he was appointed commander-in-chief of the national guards, and in that capacity made heroic struggles in favor of order and humane conduct. His efforts saved the king and queen from mob violence, which was threatened at the palace of Versailles. In 1790 the constitution was adopted, Lafayette resigned his command in the army, and retired to his estates at La Grange. He and two others were appointed major-generals in 1792, but after operations on the Flanders frontier he was removed by the Jacobins. Escaping to Liege, Belgium, he was taken prisoner by the Prussians and Austrians, and remained principally at Olmutz, but was liberated by the efforts of Napoleon in 1797. He became a member of the chamber of deputies, in 1818, where he advocated liberal legislation. In 1824 he made a visit to America at the invitation of congress, and was given a triumphant reception. Congress voted him a township of land and a cash fund of $200,000. In the Revolution of 1830 he was appointed general of the national guards, and in that capacity aided in securing the throne to Louis Philippe.

LAFAYETTE COLLEGE, an educational institution situated in Easton, Penn. It was chartered in 1826 and formally opened in 1832. The assets have a value of $1,250,000, the students number 400, and the library includes 27,500 volumes.

LAFONTAINE (lä-fŏn-tān'), **Jean de**, author and poet, born in Champagne, France, July 8, 1621; died in Paris, April 13, 1695. He studied in the grammar school of his native town and at the seminary of St. Magloire. The duchess de Bouillon invited him to Paris, where he became interested in writing verse and translating from early authors. He published a translation of the "Eunuchus" of Terence in 1654, and in 1659 received a pension of 1,000 francs from Fouquet on account of the poem "Adonis." Subsequently he formed a close friendship

with Boileau, Moliere, and Racine, and was made a member of the French Academy. In character Lafontaine was frivolous and reckless, yet he possessed many personal charms and a strong intellect, and his writings are marked by distinct originality and deep study. Inspiration for his productions was drawn from Ariosto, Boccaccio, Rabelais, and other famous writers. Many of his writings have gone through numerous editions, particularly his "Tales" and "The Fables."

LAGOON (lȧ-gōōn'), a shallow lake connected with the sea or a river. Lagoons are of frequent occurrence, especially in Italy, Holland, and South America. In the summer time they frequently dry up or become stagnant pools. The term is also applied to small ponds in some sections of the country, though chiefly in the western part of the United States.

LAGOS (lä'gōs), a city of Mexico, located in the state of Jalisco, and connected with the capital by the Mexican Central railroad. The surrounding country contains extensive deposits of iron ore and opal. Its jobbing trade and manufactures are rapidly developing. Population, 14,560.

LAGOS, a British possession, situated on the western coast of Africa, about 150 miles east of the Gold Coast and near the Bay of Benin. The district has an area of 990 square miles and an estimated population of 95,500. The city of Lagos is situated on an island of the same name, which contains an area of about four square miles. There are exports of cotton, gum, palm kernels, and copal; and imports of tobacco, hardware, cotton goods, and machinery. The district was acquired by Britain in 1861, when it was governed from the Gold Coast, but an independent government was established for it in 1886.

LA GRANGE (lä grŏnzh'), **Joseph Louis**, mathematician, born in Turin, Italy, Jan. 25, 1736; died in Paris, France, April 10, 1813. He was of French extraction, studied at the College of Turin and at Berlin, and in 1754 was made professor of mathematics in the Artillery School in Turin. Frederick the Great of Germany appointed him director of the Academy at Berlin, in 1759, where he continued is work in higher mathematics, and applied that branch to the sciences of astronomy and physics. In 1762 he published his "Calculus of Variations," a work upon which his reputation is based. He secured a prize at the French Academy in 1764 for his memoir entitled "Libration of the Moon," in which he practically applied several principles in astronomy, afterward also utilized in mechanics. Napoleon bestowed upon him the cross of the Legion of Honor, made him count, and also a member of the senate. His writings not named above include "Memoirs on the Motion of Fluids;" "Provocation of Sound;" "Analytical Mechanics," and "New Method."

LAHORE (lä-hōr'), an important city of India, capital of the Punjab, on the Ravi River. It is connected by important railroads with many other trade emporiums. The site of the city includes 640 acres and is surrounded by brick walls sixteen feet high. Entrance into the city is effected by thirteen gates. The streets are tortuous, narrow, and contain few modern improvements. Among the principal buildings are the fort, which occupies a prominent position, and the Punjab University, one of the most noted educational institutions of India. Other institutions are the Law School, Oriental College, Mayo Hospital, Medical School, and Roberts Institute. The Mongol Empire had its seat of government at Lahore beginning with 1524, and during that period the city attained its greatest prosperity. It became the capital of the Sikhs in 1799, and in 1849 was made the capital of the Punjab province. The inhabitants are made up largely of Mohammedans, who maintain many fine mosques and several seminaries. There is an extensive trade in live-stock, cereals, and manufactures. Population, 178,500.

LAKE CHARLES, a city in Louisiana, capital of Calcasieu parish, on the Calcasieu River. It is the converging center of several railroads and is surrounded by a fertile cereal and fruit-growing region. There are manufactures of sugar, cigars, railroad cars, lumber products, and machinery. The city has electric lights, waterworks, and several fine school and church buildings. Population, 1900, 6,680.

LAKE DISTRICT, a region of England embracing a portion of Cumberland, Westmoreland, and Lancaster counties, in which sixteen small lakes are situated. The region is a favorite resort for tourists, and has suggested many poetical gems to different writers of eminence. Coleridge, Southey, and Wordsworth, besides many others, took up their residence in the Lake Region, and became known as the "Lake School Poets," a name suggested by the "Edinburgh Review."

LAKE DWELLINGS, the habitations built by ancient peoples on small artificial islands in lakes, or on piles in the shallow margins of lakes. These dwellings were mentioned by Herodotus, who described a Thracian tribe living in the year 520 B. C. in a small mountain lake of what now is included in Roumelia. The custom of constructing buildings of this character prevailed in Europe through many centuries. Among the best evidences of such structures are those found in Switzerland in 1854, and which form the theme of a historic work by Dr. Keller, of Zurich, entitled "Lake Dwellings of Switzerland and Other Parts of Europe." The remains in Switzerland were discovered in many of the lakes, but particularly in Lake Zurich, when the waters of

that body materially receded during a drought. Similar remains of lake dwellings were discovered in Ireland in 1839, and, like those of Switzerland, contained specimens of earthenware, weapons of bronze, hatchets, ornaments of bone and minerals, implements of war, and coins containing Roman and Gaulish impressions.

The lake dwellings belonged most commonly to the iron age, since many of the shields, bridle bits, and implements found were made of iron. The dwellings described by Herodotus were approached by a narrow bridge, and in the floor of each dwelling was a trap-door whereby fishing from the domicile was facilitated, and the fish lured there by feeding. Many of the remains throw light on prehistoric man, and give evidence that pile buildings were used extensively for many centuries. It is also noteworthy that lake dwellings still exist among barbarous tribes, being found in portions of the Caroline Islands, the Malay Archipelago, and New Zealand. In Lake Maracaybo, Venezuela, and in various parts of Russia lake dwellings are occupied by semi-civilized people. Others exist in Central Africa, where they are occupied for convenience in fishing and as a means of defense against wild animals and savages.

LAKE MALAR, an important lake of Sweden, situated immediately west of Stockholm. It is noted for its navigation facilities and fisheries. Many castles adorn its shores. It contains about 1,200 islands, most of which are wooded.

LAKE OF THE THOUSAND ISLANDS, the name applied to an expansion of the St. Lawrence River, extending from Lake Ontario about forty miles down the river, and containing about 1,600 islands. Wolf Island is the largest, being about twenty miles long and seven wide.

LAKE OF THE WOODS, a lake situated between Minnesota, Manitoba, and Ontario, about 215 miles west of Lake Superior. It contains a number of wooded islands, is about one hundred miles long, and receives the water of Rainy River. Its outlet is Winnipeg River, by which it is connected with Lake Winnipeg.

LAKES, The Great, five great fresh-water bodies of North America. They include Lakes Superior, Huron, Michigan, Erie, and Ontario, of which the first named is the largest fresh-water lake in the world. The five lakes are connected with each other, the overflow being discharged naturally by the St. Lawrence River into the Gulf of St. Lawrence. However, a portion of the outflow is now carried to the Mississippi through the Chicago Drainage Canal. Lake Michigan is wholly within the United States, and the other four form a portion of the natural boundary between that country and Canada. Following is a comparative table relative to size and elevation:

NAME.	AREA, SQUARE MILES.	ELEVATION ABOVE SEA-LEVEL
Ontario.....	7,240	247
Erie.....	9,600	573
Michigan.. ...	22,450	581
Huron	21,000	578
Superior.....	31,200	602

LAMAR (lä-mär'), **Lucius Quintus Cincinnatus**, statesman, born in Putnam county, Georgia, Sept. 1, 1825; died at Macon, Jan. 23, 1893. He studied at Emory College, was admitted to the Georgia bar in 1847, and two years later became professor of mathematics in the University of Mississippi. In 1853 he was elected representative to the state legislature, and in 1856 secured an election to congress from Mississippi, where he had settled in 1854. At the beginning of the Civil War he resigned and entered the Confederate army, and later became a representative to Europe, where he solicited financial aid and government recognition. When the war closed, he had attained the rank of colonel, and in 1866 was elected professor of political economy in the University of Mississippi, where he taught till 1872, when he was again elected to congress. He was reëlected in 1874, became United States senator in 1877, and served till 1885, when he became secretary of the interior under President Cleveland. In 1887 he was appointed associate-justice of the United States supreme court.

LAMARCK (lä-mark'), **Jean Baptiste Pierre Antoine de Monnet, Chevalier de**, naturalist and evolutionist, born in Picardy, France, Aug. 1, 1744; died Dec. 18, 1829. He studied medicine at Paris, joined the French army in the Seven Years' War, but, on account of an injury, resigned and resumed the study of medicine at Paris. While there he became interested in physical sciences, botany, and zoölogy, and for the purpose of supporting himself worked in a banker's office. In 1788 he was elected botanist at the Jardin du Roi, and in 1793 became professor of zoölogy at the Museum of Natural History. After long years of careful study, he announced his belief in the doctrine of spontaneous generation, and held views in relation to the origin of species similar to those of Darwin. The most important of his publications is "Philosophy of Zoölogy," a work that went through many editions and translations. Other publications from his pen are "Jardin des Plantes;" "Flore Française;" "Histoire des Animaux Sans Vertebres," and "Dictionary of Botany."

LAMARTINE (lä-mar-tēn'), **Alphonse Marie Louis de**, statesman and author, born in Macon, France, Oct. 21, 1790; died Feb. 28, 1869. He descended from a good family, studied at Lyons and Belley, and showed particular interest in poetical literature and travel. In 1811 he made a tour of Italy, where he resided much of the time

after 1815. He published his "Poetical Meditations" in 1820, and the same year was attached to the legation at Naples, where he married Eliza Birch, a wealthy English lady. He became secretary of legation at Florence in 1824, and in 1829 secured an election to the French Academy. Three years later he traveled in the East, but while at Jerusalem was notified of his election to the chamber of deputies, and soon after returned to Paris, where he took an interest in political affairs and pursued his literary studies. In the Revolution of 1848 we find him a member of the provisional government that formed the republic, and of which he became the first minister of foreign affairs. His able statesmanship brought him into popularity, and his promptness caused the suppression of several anarchistic insurrections. However, he soon lost favor, and in 1851 withdrew from public affairs, engaging after that wholly in literary work. The government granted him a pension in 1867. His best writings include "History of the Girondins;" "History of the Revolution of 1848;" "History of Turkey;" "Restoration of Monarchy in France," and "Harmonies, Political and Religious."

LAMB, Charles, humorist and essayist, born in London, England, Feb. 18, 1775; died there Dec. 27, 1834. Though his parents were poor, they provided for his education at Christ's Hospital. His industrious activity in London supplied him with the richest materials, and his mind became imbued with the spirit of the master writers. The fact that his sister, Mary Anne, ten years older than himself, was subject to fits of insanity caused him to be called upon to minister to her wants, and in 1796 she killed her mother while under the influence of the malady. Subsequently he cared for his sister a period of thirty-eight years, and the two shared in publishing four books for juveniles, entitled "Poetry for Children;" "Tales from Shakespeare;" "Adventures of Ulysses," and "Mrs. Leicester's School." He also contributed to various periodicals, among them the "London Magazine." Lamb was a contemporary of Coleridge and the two were fast friends. His "Specimens of the Old English Dramatists" was gathered from the writers of the Elizabethan age, and from them he attained a wide reputation as critic, and also opened to the world divers treasures of poetry before unknown to many readers. In 1818 he collected all his essays and verses, which he published as the "Works of Charles Lamb." Others of his writings are "Old Familiar Faces;" "Essays of Elia," and "Farewell to Tobacco." His sister, Mary Anne, was born in 1765; died Sept. 3, 1847. Many of the writings of Lamb are still widely popular, are frequently republished, and have a favorite place in school readings, especially the "Tales from Shakespeare."

CHARLES LAMB.

MARTHA J. LAMB.

LAMB, Martha Joanna, authoress, born in Plainfield, Mass., Aug. 13, 1829; died in New York City, Jan. 2, 1893. Her career as a writer began at an early age. She married Charles A. Lamb in 1852, removed with her husband to Chicago, and there founded the Home for the Friendless. In 1866 she removed to New York, and subsequently devoted her attention exclusively to literature. Her excellent "History of the City of New York" was published in two volumes in 1881, and in 1883 she became editor of the "Magazine of American History." Her writings include "Play School Stories;" "Wall Street History;" "Tombs of Old Trinity," and "Christmas Owl."

LAMBALLE (lŏn-bäl'), **Marie Therese Louise of Savoy-Carignan, Princesse de,** victim of the French Revolution, born in Turin, Italy, Sept. 8, 1749. She married the prince of Lamballe in 1767, and soon after his death was chosen the companion of Marie Antoinette. When the king and queen attempted to flee from France, she found safety in England, but returned to France in 1792. In August of that year she was permitted to be confined with the queen, but when she refused to swear hatred against the king and queen on Sept. 3, 1792, she was cut to pieces by sabres and portions of her body exhibited before the windows of the temple where the royal family was held captive.

LAMBERT (lăm'bert), **Daniel,** noted giant, born in Leicester, England, March 13, 1769; died June 21, 1809. At the age of twenty-three he weighed 450 pounds, was five feet eleven inches tall, and was remarkable for great physical strength. At the time of his death he weighed 740 pounds.

LAMBERT (lăm'bert), **Johann Heinrich,** philosopher and mathematician, born in Mühlhausen, Germany, Aug. 29, 1728; died in Berlin, Sept. 25, 1777. Though the son of a poor tailor, he secured a liberal education, and made remarkable progress in the study of philosophy, mathematics, and Oriental languages. Frederick the Great summoned him to Berlin in 1764, where he became a member of the Academy of

Sciences and of the Council of Architecture. In 1774 he had general superintendence of the "Astronomical Almanac." Lambert is rated the most efficient and masterful metaphysician, mathematician, and logician of the 18th century. He laid a scientific basis for measuring the intensity of light, and succeeded in adapting mathematics to philosophy and logic. His writings embrace "Photometria;" "Organic Formations;" "Cosmology;" "Treatise on Mathematics," and "New Organs."

LAMMERGEIER (lăm'mẽr-gī-ẽr), meaning in German lamb vulture, the largest bird of prey native to Europe, and found in the lofty mountains of southern Eurasia and northern Africa. It forms a connecting link between vultures and eagles, measures ten feet between extended wings, and from four to five feet from beak to tail. The lammergeier feeds on both carrion and living prey, including such animals as kids, lambs, chamois, and hares, which it carries to great heights in the mountains. It utilizes the bones of animals as a food by dropping them upon rocks from vast elevations, thereby breaking them into pieces suitable to be swallowed.

LAMMERGEIER.

LAMONT (lȧ-mônt'), **Daniel Scott**, statesman, born in Courtlandville, New York, Feb. 9, 1851. After attending McGranville Academy and Union College, he became the publisher of a newspaper, and later attained to influence as a democratic leader of New York. In 1885 he was made private secretary to President Cleveland, and during the second term of the latter was secretary of war.

LAMP, a device employed for producing artificial light. The term is applied to vessels containing an inflammable liquid and a wick through which the liquid ascends by capillary attraction to feed the flame at the top, and also to any other contrivance for producing artificial light. In early times lamps were vessels of rude pottery or even the shells or skulls of animals, but later they were made of metal, glass, or porcelain, and became articles of ornament as well as utility. The substances used to produce light included fish oils and animal fats, but later vegetable oils, such as rape, were introduced. The flat wick was introduced in 1783, and the round wick in 1784, the latter being known as the Argand wick from its inventor, Aimé Argand (1755-1803), a German chemist.

The discovery of mineral oils and their preparation in the form of gasoline, kerosene, paraffin, petroleum, and crystal oil made it necessary to introduce oxygen into the burner in order that the carbon contents might be consumed properly. A lamp supplying this requirement was first made by the inventor Stob Wasser in Berlin, Germany, and the chimney of mica, porcelain, or glass was constructed to increase the draught and protect the flame of the lamp. This arrangement causes a powerful draught to be created, by which the flame is kept uniform, and there is a constant consumption of the gas that generates from the oil being heated. At present there are many kinds of lamps, including those known as electric, gas, safety, oil, arc, and lanterns. The wicks used are either single flat wicks, round wicks, or double wicks. Lanterns are either portable or fixed, and serve for lighting during the time of rain or wind.

LAMPBLACK, the soot or carbon deposit obtained by the imperfect combustion of petroleum, tar, resin, and other substances containing carbon. In burning the substances for lampblack it is necessary to shut out the free flow of oxygen, when the flame becomes smoky and the soot may be accumulated on suspended surfaces. Lampblack is useful in the manufacture of printing inks, shoe-blacking, and paint; its effect is to produce the various shades of brown or black for painting. In preparing lampblack for use it is commonly mixed with linseed oil, and for painting with linseed oil and white lead.

LAMPREY (lăm'prў), a genus of fishes, but differing from true fish in that they do not possess scales, paired fins, or jaws. In appearance they are eel-like, attain a length of nearly three feet, and have a mouth in the form of a sucker. Most species have a greenish-brown color. They inhabit both fresh and salt water bodies, occurring in the north and south temperate zones, and feed on larvæ and worms. They also attach themselves by the mouth to other fish to suck the blood. The fresh-water lamprey is smaller than the marine, but both have been used as food for many centuries, and are caught by traps bated with flesh or worms.

LANCASTER (lănk'as-tẹr), a city in Ohio, county seat of Fairfield county, on the Hocking River and Hocking Canal, and connected by several important railroads. The surrounding country is agricultural and produces coal and natural gas. It is supplied with modern municipal facilities, and near it is the state reform farm for boys. The manufactured products embrace flour, woolen goods, shoes, agricultural implements, and machinery. It is the birthplace of General Sherman and John Sherman. Population, 1900, 8,991.

LANCASTER, an important city in Pennsylvania, county seat of Lancaster county, situated about thirty-five miles southeast of Harrisburg. It is noted as a manufacturing and railroad center, has an excellent public school system, public parks, street railways, and other important municipal improvements. Besides other educational institutions, it contains Franklin and Marshall College, an institution for the higher education of men, controlled by the German Reformed Church. This institution has a fine faculty of instructors, 400 students, and a library of 34,000 volumes. The manufactories of the city represent a capital of $9,750,000, include about 550 different establishments, and produce paper, machinery, spirituous liquors, cotton and woolen goods, leather, ironware, and caramel products. The continental congress met at Lancaster in 1777, while the British were occupying Philadelphia, and it was the capital of the state from 1779 to 1812. Population, 1900, 41,459.

LANCASTER, House of, a dynasty founded in England in the reign of Edward III. Blanche, daughter of Edward III., married John of Gaunt, and a royal charter settled the duchy upon him and his heirs. Henry IV., son of John of Gaunt, born in 1367, was the first king of the house of Lancaster. His son, Edward V., succeeded him on April 10, 1413, and with the death of Henry VI., son of Henry V., ended the dynasty, which occurred May 22, 1471, though Henry VI. reigned only till 1461. See **England**.

LANCELET (lăns'lĕt), a peculiar fish found in the temperate and tropical seas. Its body is lance-shaped, slender, compressed, and transparent. It has no true jaws or skull, has colorless blood, and moves with considerable activity. Breathing takes place by admitting water through the mouth. The common lancelet is about two inches long. There are six species that have been studied.

LAND LEAGUE, an organization formed by Michael Davitt under a plan formulated by Parnell in 1879, by which land in Ireland was to be purchased for the Irish tenants. Funds for this purpose were subscribed largely in America, but the movement was suppressed in 1881. Subsequently the National League, a political and agrarian organization, was formed for the purpose of bettering the condition of Irish tenants and advocating home rule for Ireland.

LANDOR (lăn'dẽr), **Walter Savage**, prose and poetical writer, born in Warwick, England, Jan. 30, 1775; died in Florence, Italy, Sept. 17, 1864. He studied at Rugby and Oxford, but quitted the university before graduating. After the death of his father, he succeeded to the family estates, and in 1808 joined the Spanish patriots, where he succeeded to the rank of colonel. He married Julia Thuillier in 1811, and resided in Italy the greater part of the time. His first volume of poems appeared in 1795 under the name of "Count Julian," and soon after appeared his "Gebir," by which he won the friendship of Southey. Landor ranks more eminently as a prose writer than a poet, and his thorough classical scholarship enabled him to depict Greek and Roman characters with much facility and accuracy. At the time of his death he was an exile from his country and was misunderstood by the majority of his countrymen, but his productions later placed him in better esteem. His writings include several of much value, among them "Imaginary Conversations of Literary Men and Statesmen;" "Last Fruit Off an Old Tree;" "Examination of Shakespeare;" "Hellenics;" "Pericles and Aspasia," and "Letters by a Conservative."

LANDSEER (lănd'seer), **Sir Edwin Henry**, animal painter, born in London, England, March 7, 1802; died there Oct. 1, 1873. He was the son of John Landseer (1769-1852), an eminent engraver, and was taught by his father to sketch animals and natural scenery at an early age. When thirteen years of age, a number of his productions were exhibited at the academy, and there attracted marked attention. In 1866 he declined the presidency of the Royal Academy. Among his productions are "Cat's Paws;" "Fighting Dogs Catching Wind;" "Return from Deer Stalking;" "Stag at Bay;" "High Life and Low Life;" "Flood in the Highlands;" "Return from Hawking;" "Defeat of Comus;" "Monarch of the Glen;" "Jack in Office," and "Shepherd's Chief Mourner."

LAND'S END, the most southwestern cape of England, directly opposite Scilly Isles. About a mile west of Land's End are the Longships Rocks, on which a modern lighthouse is situated.

LANDSLIDE, or **Landslip**, the settling down of a considerable portion of earth from a higher to a lower level, and frequently the cause of damage to life and property. Landslides are caused by the action of water undermining the banks, which fall by decay of supporting strata, and also by earthquake disturbances. In many instances traffic on railroads has been delayed, and in other cases entire villages were buried. A landslip occurred on the Isle of Portland in 1760, in which a tract equal to an area of a mile and a quarter suddenly spread over the lower level. Other instances include a landslide at Rossberg, Switzerland, in 1806; at Glarus, Switzerland, in 1881; and at Zug, Switzerland, in 1887. Another noted landslide occurred in the Himalayas at Naini Tal in 1880, when about 230 persons were killed.

LANDSTURM (länt'sturm), a term applied in Germany to the local militia, which is utilized only in case of actual invasion, and is constituted of men too old for the landwehr. This system has been adopted in other nations of Eurasia, notably in Austria, Greece, and Japan.

LANDWEHR (länt'vār), the military force of Germany, Austria, and other nations of Europe which is called out only for occasional training in time of peace, but in war it takes its place in the regular army of defense and offense. It differs from a militia in that all landwehr soldiers have previous military training. In Germany this system is thoroughly developed. There the landwehr constitutes a powerful organization, and supplements the regular forces without material expense.

LANE, Joseph, soldier and statesman, born in Buncombe county, North Carolina, Dec. 14, 1801; died at Roseburg, Oregon, April 9, 1881. In 1816 he removed to Indiana, where he became a clerk in a store. He was elected to the state legislature in 1822, which office he held till 1846, when he enlisted in the Mexican War. His eminent military services caused his promotion to the rank of major-general. In 1848 he became governor of Oregon and served as delegate to congress in 1851-57. He was United States senator in 1859-61. The democrats nominated him for vice-president with Breckinridge, and after his defeat he retired from public service.

LANFRANC (lān'frank), bishop of Canterbury, born in Pavia, Italy, about 1005; died in Canterbury, England, May 24, 1089. He descended from a noble family of Italy, studied at Pavia and Bologna for the profession of law, and in 1039 founded a law school at Avranches, France. In 1046 he was chosen prior of the monastery of Bec, and in 1066 became prior of the St. Stephen monastery at Caen under appointment of the duke of Normandy. Four years later he was made bishop of Canterbury, where he exercised much influence on the early church work of England. He published "Treatise against Berengar;" "Sermons," and "Commentaries on the Epistles of St. Paul."

LANG, Andrew, author, born in Selkirk, Scotland, March 31, 1844. He studied at Edinburgh Academy, St. Andrews University, and at Oxford, and in 1868 was elected fellow of Merton College, Oxford. As a writer and lecturer he attained much popularity, his productions embracing an important line of ballads, translations, and essays. Among them are "Ballades in Blue China;" "Gold of Fairnilee;" "Blue-Fairy Tale Book;" "History of St. Andrew;" "Monk of Fife," and "At the Sign of the Ship."

LANGLEY (lăng'lĭ), **Samuel Pierpont**, astronomer and physicist, born in Roxbury, Mass., Aug. 22, 1834. His education was obtained largely in the Boston Latin School. He was elected assistant at the Harvard Observatory in 1865, and soon after became professor of mathematics in the United States Naval Academy at Annapolis. Two years later he was chosen professor of astronomy at the Western University of Pennsylvania, and subsequently made a number of important observations of eclipses under the auspices of the government. In 1887 he became secretary of the Smithsonian Institution. Among the distinguished honors granted him are the Rumford medal from the Royal Society of London; membership in the National Academy of Sciences, and presidency of the American Association for the Advancement of Science. Besides inventing the bolometer, an instrument to note slight changes in temperature, he devised a flying-machine. He published "New Astronomy;" "Internal Work of the Winds," and "Experiments in Aërodynamics."

LANGTON (lăng'tŏn), **Stephen**, cardinal and archbishop of Canterbury, born in Sussex, England, in 1150; died July 9, 1228. He studied at the University of Paris, of which he afterward became chancellor. Pope Innocent III. was his personal friend and in 1206 made him cardinal, and the following year consecrated him as archbishop. He was opposed by King John, but, after an interdict was placed upon England and John excommunicated, Langton was permitted to enter upon his duties, in 1213. The same year he joined the insurgent barons, and gave them enthusiastic support in compelling John to sign the Magna Charta. In 1218 he crowned Henry III., and five years later demanded of him strict compliance with the Magna Charta. Several theological treatises were published by him.

LANGUAGES, the aggregate of those articulate sounds, called words, that are used to express perception and thought, and which are accepted by and current among the different communities. There are more than 1,000 different languages, more or less allied to each other, but differing to such an extent that people of different classes cannot successfully communicate with each other by means of speech. Speeches allied, but still differing from the principal languages, include many thousands. Many writers think that language was originally revealed from heaven, and that the form was Hebrew. These writers assume that all other languages originated from the Hebrew, but others think that Hebrew, Chaldee, and Arabic are only dialects of the original tongue. Many scholars, among them Horace, Lucretius, and Cicero, expressed the view that language is of human invention, and that the sounds and words uttered by the primitive peoples under a process of evolution extended into the first languages. From the beginning accessions were made as education and discovery provided new requirements, such as still occur at the discovery of every new principle and the invention of all devices. This constant addition is exemplified in those that resulted after the invention of the telephone, telegraph, and improvement in electrical machinery, all of which added hundreds of words to the languages of civilized nations. Besides, it is evident that the more advanced the edu-

cational arts of a people, and the higher their civilization, the greater becomes the need for an extensive vocabulary and enlarged lexicons.

Modern languages include the Chinese; those derived from the Aryan, or Indo-Germanic; and the Semitic. The Chinese language has many dialects. Its origin is unknown. That it existed for many centuries is apparent, being spoken as far back as any traces of Chinese history extend, and to-day it is the most widely used of all the languages. The Aryan, or Indo-Germanic, group of languages, is the most important in that it embraces the language of the best literature and of the most cultured nations of the world. It is classed in seven great branches: The Hindu or Indian; Iranian or Persian; Greek; Italic; Celtic; Slavonic; and Germanic. Each of these has many subdivisions; thus, the Germanic branch includes the German, English, Scandinavian, and Icelandic branches. The German language is an outgrowth of the Old Germanic, when it included the Gothic, Lombardic, Saxon, and many other dialects. The English language is principally an outgrowth of the German, but many words have been added from the Latin, French, etc. Besides, many original terms have been incorporated with it. The Semitic family of languages is next in importance to the Aryan group. It embraces the Arabic, Syrian, Assyrian, Babylonian, and Canaanitish dialects, and includes the more important Hebrew and Phœnician. It is difficult to give an accurate statement of the exact number of people speaking the different languages for the reason that in some countries the dialects are mixed greatly and are changing constantly with various effects. It is reasonably certain that the Chinese is spoken by 410,000,000 people, while the Japanese is spoken by 50,000,000. The principal classes of the Aryan or Indo-Germanic group of languages are spoken in practically the following order: Hindu, 200,000,000; English, 118,000,000; German, 115,000,000; Russian, 95,000,000; French, 50,000,000; Spanish, 50,000,000; and Italian, 35,000,000. See **Aryan**.

LANIER (lăn'ĭ-ẹr), **Sidney**, soldier and poet, born in Macon, Georgia, Feb. 3, 1842; died in Lynn, North Carolina, Sept. 7, 1881. He graduated at Oglethorpe College at the age of eighteen years, and soon after the capture of Fort Sumter enlisted in the Confederate army. His service in the battles near Richmond was especially efficient, and in 1864 he was taken prisoner and confined five months at Point Lookout, Florida. In 1867 he was engaged as teacher in an academy, and the following year formed a law partnership with his father at Macon. Soon after he produced a number of excellent literary works, and afterward devoted himself entirely to music and literature. His work was largely interfered with by delicate health, but his poems show fine ethical thought and excellent melody. Among his writings are "Boys' King Arthur;" "Florida;" "Science in English Verse;" "Boy's Percy;" "Centennial Ode;" "Tiger Lilies," and "English Novel and Its Development."

LANNES (lăn), **Jean**, duke of Montebello and marshal of France, born at Lectoure, France, April 11, 1769; died in Vienna, Austria, May 31, 1809. He was the son of a liveryman, studied the art of dyeing, but in 1792 enlisted for service in the army sent on a campaign into Spain and Italy, and by 1796 attained the rank of brigadier-general. In 1798 he accompanied Napoleon on his expedition to Egypt, and in 1800 gained the battle of Montebello, Italy. His services on the field of Marengo were also distinguished, and he had chief command at Austerlitz, Jena, Eylau, and Friedland, and in 1808 defeated the Spaniards at Tudela and Saragossa. At the battle of Aspern, in the Danube campaign, fought May 22, 1809, he lost both legs by a cannon ball, from the effects of which he died.

LANSING, the capital city of Michigan, in Ingham county, on the Grand River, eighty-five miles northwest of Detroit. It is extensively connected by railroads, has electric lights, waterworks, street railways, public parks, and contains a fine school system. It is also the seat of the Michigan School for the Blind, and the State College of Agriculture, the latter having 500 students and a library of 25,000 volumes. The surrounding country contains an abundance of coal and timber and is noted for its fertility. Among the manufactures are condensed milk, flour, stoves, wagons, pressed stone, steam engines, and machinery. There are excellent state and county buildings, numerous substantial churches, and an extensive jobbing trade. Population, 1904, 20,276.

LANSINGBURG (lăn'sĭng-bûrg), a city of Rensselaer county, New York, on the Hudson River, four miles north of Troy. A substantial bridge across the Hudson connects it with Cohoes and Waterford, while an electric street railway extends to Troy. Its manufactures embrace carriages, clothing, cigars, and machinery. The municipal facilities are modern. Population, 1900, 12,595.

LANTERN FLY, a genus of insects allied to the cicadas, and common to the tropical regions of Eurasia, South America, and Africa. There are twenty species, all of which are large, highly colored, and remarkable because of the forehead being formed in the semblance of a bag. Most of the species are about three inches long, five inches across the wings, and move about most commonly during sunshine.

LAOCOON (lā-ŏk'ō-ŏn), in Greek legend, a priest of Apollo and Neptune, located in the city of Troy during the Trojan War. It is asserted that while he and his two sons were in the temple performing the sacrifice, two enormous serpents arose out of the sea and proceeded directly to the altar. The

serpents entwined themselves about the helpless youths and the father, and all were destroyed in the presence of the Trojan multitude. This event was taken by the Trojans to indicate the displeasure of Zeus on account of Laocoön warning the people against admitting the wooden horse into the city. The incident is of interest on account of many beautiful groups of sculpture having been made to represent it, and also because many Greek poets mention it in their writings. The most beautiful group of sculpture representing Laocoön and his sons was discovered at Rome in 1506, and is now in the Vatican. Pope Julius II. purchased it shortly after its discovery, but Napoleon took possession of it in 1796, and in 1814 it was replaced. It is thought to be the group mentioned by Pliny.

LAOCOON.

LAODICEA (lā-ŏd-ĭ-sē'a), the name of several ancient cities of Asia Minor, the most important of which was situated near the Lycos River in Phrygia. It was founded by Antiochus Theos and named after his queen Laodice. As a center of philosophy, art, and science it took high rank and became the seat of two important ecclesiastical councils, one in 363 A. D. and the other in 476. Its importance in the primitive history of Christianity is accounted for by the large number of Jews that settled there at the beginning of the Christian era. It is now entirely in ruins, and is known as Eski-Hissar.

LAOS (lā'ōs), a distinct class of Chinese who occupy the northeastern portion of Siam, and regarded the original Siamese race. Formerly they constituted a powerful kingdom, but in 1828 were conquered by the Siamese, and since then have been subject to them. The Laos are divided into two main divisions; the so-called White Paunch and the Black Paunch. The two branches occupy different regions, but they are related more or less closely and agree in the support of Buddhism and in their semi-civilized government. They are peaceable, industrious, fond of music, and engage largely in fishing, rice and vegetable culture, and poultry and stock raising, and have fixed homes. Their total number is about 1,500,000. The region occupied by the Laos, known as Laos, has an area of 91,000 square miles, and since 1893 has been a French protectorate.

LA PAZ (lä päth'), a Mexican town and seaport, situated in Lower California, capital of the state of Baja. Its harbor on La Paz Bay is commodious. There is a considerable trade in pearl-fish and minerals. In its vicinity are extensive stock ranches and orchards. Population, 6,500.

LA PAZ, a city of Bolivia, capital of a department of the same name, and noted for its wealth and commercial trade. It is situated about forty-two miles southeast of Lake Titicaca, in a fertile valley, and has an elevation of 11,950 feet above sea-level. The city contains some excellent buildings, has a public school system, and is the seat of a seminary, college, medical school, cathedral, and university. It is the residence of a bishop and has a number of convents. There is an extensive trade in alpaca wool, tobacco, copper, lumber, gold, and silver. The manufactures include textiles, furniture, machinery, clothing, and vehicles. The inhabitants consist largely of mixed races and Aymara Indians. Population, 82,500.

LAPIDARY (lăp'ĭ-dā-rў), one skilled in the art of working in stones, especially precious stones. The lapidary art was developed by the ancients. Remains of stone implements found in cave dwellings and other habitations are among the earliest examples of the art. Assyrian workmen invented the drill for penetrating hard substances prior to the year 760 B. C. Beautiful specimens of seals and engraved rings made by the Greeks as early as 600 B. C. attest their advancement along this line. It is thought that the Hindus and Chinese were acquainted with the cutting, engraving, and polishing of small stones very early in history, but the art was not developed as it applies to diamond cutting in Europe till 1475, when Charles the Bold of Burgundy had the first expensive diamond prepared in Europe. Formerly this class of work was done by hand, when it was effected by the powder of a harder stone being rubbed against a softer, but subsequently different tools were adapted to machine use. The machinery consists of very accurate appliances. In the process three stages are necessary: cutting or slicing, grinding, and polishing. The cutting is done to prepare the general outline of the product desired; the grinding to bring it to its proper form and shape, and the polishing to give it a beautiful surface finishing. Formerly polishing was done by a pewter with stone coating, but at present it is effected with a wheel covered with some substance suitable for polishing, such as walrus hide. The kind of tools used depends entirely upon the stone to be treated.

LAPIS LAZULI (lā'pĭs lăz'ū-lī), or **Armenian Stone**, a rich blue mixture of minerals, of which the principal is lazurite. It was employed largely by the ancients for decorative purposes. It occurs principally in crystalline limestone in North and South America, Thibet, Russia, China, and many other countries. When powdered, it constitutes a durable blue paint called ultramarine, which was employed formerly to some

extent, but it has been replaced by an artificial preparation of similar composition that is equal in color and durability, and is now used extensively in the arts. Imitations of lapis lazuli are made of bone ashes colored with oxide of cobalt.

LA PLACE (lä pläs'), **Pierre Simon, Marquis of,** mathematician and astronomer, born in Beaumont-en-Auge, France, March 23, 1749; died in Paris, March 5, 1827. He was educated in his native town and Caen, taught mathematics in the military school at Beaumont, and later went to Paris. While there he approached D'Alembert with letters of recommendation, and, after impressing him with his treatise on dynamics, he secured a professorship in the Royal Military Academy, in which capacity he attained to eminence. In 1773 he became an associate in the Academy of Sciences, was made a member of it in 1785, and attained eminence by establishing the fixity of the solar system, announcing the so-called "Three Laws of La Place." He also demonstrated an exact theory of the phenomena of the tides and of the satellites of Jupiter. Subsequently he aided in the establishment of normal schools for teachers, thus laying a foundation for systematic education, and became recognized as one of the greatest thinkers of his age. Napoleon appointed him minister of the interior, though he was deposed after six weeks, but later made a count, while Louis XVIII., after the second restoration, made him a peer and a marquis. It is related that his last words were: "What we know is of small amount; what we do not know is enormous." He published valuable works on pure mathematics, mechanics, heat, astronomy, and electricity.

LAPLAND (lăp'land), an extensive region of northwestern Europe, the nativity of the Lapps, comprising an area of about 130,000 square miles. It is bounded on the west by the Atlantic, on the north and east by the Arctic, and on the south by the White Sea and by about the parallel of 66° north latitude. The region belongs partly each to Russia, Sweden, and Norway. In the western portions it is quite mountainous, and in the eastern a plain with numerous rivers and lakes. The two seasons are designated as day and night, the night season being nine months and extremely cold, while the day season is three months of continuous day, of which about six weeks are hot. Vegetation consists largely of mosses and small timber, including birch, fir, and pine. There are few domestic animals besides reindeers and dogs. Hunting and fishing are the principal occupations, though there are some developments in the culture of reindeer, vegetables, fodder, and rude manufacture. The lakes and coastal waters are rich in fish, particularly the White Sea and Lakes Kuto, Kano, Enara, and Imandra.

The Lapps are classed as Turanians, belonging to the Finnic branch. They are small in stature, have a flat nose, high cheek bones, and a scanty beard; are muscular, and largely red-headed. The life of many is nomadic in the summer season, when they hunt and fish, laying by a portion of the necessary supply for winter. The entire population is about 27,500, of which not more than 13,000 are in Russia, the others being in Sweden and Norway. Nearly all the Scandinavian Lapps are Lutheran, while those of Russia affiliate with the Greek Church. So far as known they were subject to the Norsemen up to the 12th century, since which time they were conquered by and alternately subject to Norway, Russia, and Sweden. The nomadic tribes have various dialects, and all have shown a marked obedience to their government.

LA PLATA (lä plä'tä), **Rio de,** an important estuary of South America, situated between Argentina and Uruguay, forming the outlet of the Parana and Uruguay rivers. Its length is 200 miles, breadth at Buenos Ayres fifty-five miles, and at its mouth 140 miles. The southern shore is level, the northern elevated, and the most important harbor is at Montevideo. Through it flows the drainage of 1,600,000 square miles, aggregating 50,000,000 cubic feet of water per minute, which is exceeded only by the Amazon, and its flow may be noticed in the Atlantic fully sixty miles from the shore. Buenos Ayres, Montevideo, and La Plata are the principal cities on the river.

LA PLATA, an important city of Argentina, capital of the Buenos Ayres province, situated about twenty-five miles southeast of Buenos Ayres City. It has had remarkable development and prosperity. Though founded in 1882, it has risen to vast commercial importance. The streets are regular, mostly paved, contain electric lights and street railways, and are beautified by parks and numerous public buildings. It contains a fine union railway station, splendid churches, an observatory, a college, and a number of government buildings. The manufactures embrace cotton and woolen goods, machinery, clothing, furniture, ironware, soap, tobacco, leather goods, and utensils. A canal connects the city with its harbor, Ensenada, on the La Plata River. Popuation, 75,500.

LA PORTE (la pōrt'), a city in Indiana, county seat of La Porte county, situated in a fine farming and dairying country, and connected by many important railroad lines. The manufactures embrace carriages, flour, woolen goods, cigars, clothing, and machinery. It has electric lights, a public library, city waterworks, and contains fine schools and churches. There is a modern county courthouse and other public buildings. Population, 1900, 7,113.

LAPWING, a genus of birds of the plover family, native to Eurasia, Africa, and Iceland. They are about the size of a pigeon, frequent marshes and woodlands, and from

their peculiar cry are frequently called peewit. Both the birds and their eggs are hunted for food, the eggs being laid largely in cultivated fields, marshes, and depressions on plains. The length of the common lapwing is about twelve inches; the color

LAPWING.

variegated, but usually brownish-red, and the male has a crest of feathers on the head, which is most prominent in the winter time. They were named lapwing from their habit of luring intruders away from their nest by appearing to be lame.

LARAMIE (lăr'a-mȳ), a river of Wyoming which has its source in northern Colorado, and after a course of about 200 miles toward the northeast joins the North Platte River at Fort Laramie. The river passes through a country rich in minerals, and is utilized for rafting lumber cut in the mountains.

LARAMIE (lăr'a-mē), a city in Wyoming, county seat of Albany county, situated in the Laramie Plains, at an elevation of 7,122 feet above sea-level. It is well connected by railroads, has excellent public schools, and is the seat of the State Agricultural College, State University, state penitentiary, and the state fish-hatchery. Its general facilities include street lighting, a public library, telephone connections, and waterworks. Besides extensive railroad and machine shops, there are manufactures of flour, soda, glass, soap, building stone, machinery, leather, and bottled goods. The city has a growing trade. Population, 1900, 8,207.

LARAMIE MOUNTAINS, a mountain range of Wyoming and Colorado, composed largely of carboniferous, triassic, jurassic, and cretaceous formations, with fossiliferous deposits at the margin. Laramie Peak, 10,000 feet high, is the culminating point.

LARCH (lärch), a genus of deciduous trees, bearing leaves in clusters and having cones. The American species are also known by the name of tamarack or kackmatack, and are native to the northern portion of North America, particularly in the Alleghany mountain region. Several species abound, most of which grow from fifteen to forty-five feet high, and are valuable for the quality of their wood. The common larch native to Switzerland, Germany, and Italy is noted for the durability of its wood, while the golden larch of Japan is counted the most beautiful species and attains a height of 125 feet. Many varieties, especially those of Asia, grow to a height of sixty feet and thrive fully 250 years. The wood is inclined to warp and does not easily decay, owing to the resinous properties. The different species yield bark for tanning, and also a gummy substance useful for cement and in medicine.

LARCOM (lär'kọm), **Lucy**, poetess, born in Beverly, Mass., in 1826; died April 15, 1893. Her father died when she was but twelve years of age, and, after attending school three years, she engaged in a cotton mill as a factory hand. At the age of twenty she entered the Monticello female seminary in Illinois for three years' study, and subsequently taught in the Norton Field Seminary of Massachusetts. She wrote many poems during the Civil War. Her published works include "Wild Roses of Cape Ann;" "Childhood Songs;" "Ships in the Mist," and "An Idyl of Work." She also edited several collections of poems, including "Roadside Poems for Summer Travelers" and "Hillside and Seaside in Poetry."

LUCY LARCOM.

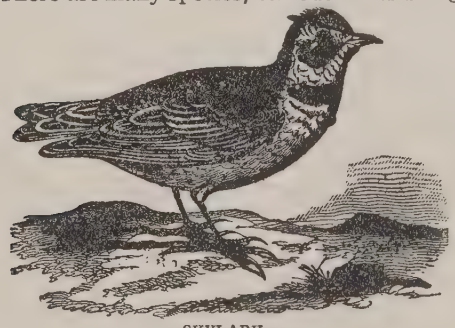
LARD, the product obtained from the fat of swine by heating to the boiling point and straining. Lard is composed chiefly of stearine and oleine, and is used for various purposes in culinary arts, and for the manufacture of soap, pomades, and lubricating oil. The enormous production of pork in America led to the separation of the oleine and stearine, which is done at a low pressure. The former is used as lard oil for lubricating machinery and the latter serves in the manufacture of candles. Much the best quality of lard is secured from the fat that surrounds the kidneys, from which ointments are prepared.

LAREDO (la-rā'dō), a city in Texas, county seat of Webb county, on the Rio Grande, and forming an important railroad center. It is the seat of extensive machine shops, is noted for its importance as a wool-shipping point, and within its vicinity are produced copper, lead, iron, zinc, and coal. There are manufactures of machinery, earthenware, cigars, and utensils. Several steel bridges cross the Rio Grande and

connect it with Nuevo Laredo, a Mexican city. It has modern municipal facilities, including electric railways and lights, city sewerage, and waterworks. There are many fine school and church buildings. Population, 1900, 13,429.

LARES AND PENATES (lā-rēz and pĕn-a'teez), in legends, the protecting spirits among the ancient Romans, and associated with domestic protection. The Lares came to the Romans from the Etruscan religion and the Penates from their early ancestors. They were worshiped by the Roman people under the form of two youthful warriors, who were in later times identical with Castor and Pollux. In many of the homes small images of these deities were placed as adornments round the hearth, and in the mansions of the rich they occupied separate apartments. They were adorned with wreaths on joyful occasions.

LARK, a genus of common birds of song, resembling the finches in many respects. There are many species, various kinds being



SKYLARK.

native to all the grand divisions and many islands. Among the best known are the meadow lark, skylark, woodlark, and shore-lark. These birds are migratory, passing to the higher latitudes in the vernal season, where they nest in hollows and depressions in the ground. The common characteristics embrace a forked tongue, short bill, feathers covering the nostrils, hind claws straight, and colors variegated, but largely sandy-brown with marking of black and yellow. The song is shrill and quite rare, except in flight, the skylark being celebrated for its prolonged song of much beauty while on the wing. In many European countries larks do damage to cereal crops, when they are caught in nets and sold on the market as a delicate food. The food consists chiefly of insects, larvæ, and seeds.

LARKSPUR, an annual plant common in the temperate zone. The flowers are prolific, generally blue, and many varieties have been developed by propagation. Among the species are the branching larkspur, upright larkspur, and the rocket larkspur. These varieties are grown extensively as garden flowers.

LA ROCHEFOUCAULD (lä rosh-foo-kō'), **Francois, Duke of**, courtier and maxim-writer, born in Paris, France, Sept. 15, 1613; died there March 17, 1680. His father was a duke under Louis XIII., and Francois became known as Prince de Marsillac in his early youth. At the age of seventeen he entered the army, took part at the siege of Casale, and was exiled by Richelieu to Blois for supporting the party of Queen Anne of Austria. He remained an exile from 1639 to 1642; afterward he supported several military exploits, and subsequent to 1653 engaged largely in literary work in his native country. In 1662 he published his "Memoirs," and later his "Réflexions, ou Sentences et Maximes Morales." The latter has gone through many editions, is still a favorite literary gem, and on account of its brilliancy of style is counted a French classic.

LARYNX (lăr'ĭnks), the special organ of voice, situated at the upper part of the windpipe. It consists of a cartilaginous box across which are stretched folds of mucous membranes. These membranes constitute the vocal cords, which, by their vibration, due to passing of air from the lungs, produce sound. The glottis is a cleft or opening between the vocal cords at the upper orifice of the larynx, while the epiglottis is a leaf-like lid upon the back of the tongue, which closes the larynx when swallowing. See **Voice**.

LA SALLE (lä säl'), a city of La Salle county, Illinois, situated on the Illinois Canal and a number of important railroads. The surrounding country is agricultural and dairying, and contains deposits of bituminous coal and building stone. Its general facilities include electric lights and street railways, pavements, excellent schools, several libraries, and a public park. Among the manufactures are glass, hydraulic cement, bottled goods, ironware, and machinery. Its shipping trade is extensive. The city has many beautiful edifices and churches. Population, 1900, 10,446.

LA SALLE, Robert Cavelier, celebrated explorer, born in Rouen, France, Nov. 22, 1643; assassinated March 19, 1687. In 1669 he emigrated to Canada, and soon after entered upon a number of remarkable expeditions of discovery. He visited the Illinois River, Lake Michigan, and the Ohio, and sailed a considerable distance down the Mississippi. In 1673 he received a grant of Fort Frontenac, now Kingston, and in 1677 returned to France. The following year he came to America, ascended to Mackinaw, thence crossed Lake Michigan,

ROBERT LA SALLE.

and proceeded down the Illinois River to Peoria. On April 9, 1682, he planted the French flag on the Gulf of Mexico, and claimed the entire Mississippi River basin for Louis XIV. In 1684 he organized a French expedition, which sailed directly down the Mississippi, but he was disappointed in establishing a French colony on the gulf. He failed in an effort to find the chief mouth of the Mississippi, but landed at Matagorda Bay, and after many fruitless efforts was murdered by his followers within the confines of Texas. There are many conflicting statements regarding the life and achievements of La Salle. A very interesting account is given in Parkman's "Discovery of the Great West."

LAS CASAS (läs cä'säs), **Bartolme de**, evangelist and philanthropist, born in Seville, Spain, in 1474; died in Madrid, in July, 1566. He was of French descent, studied at Salamanca, and accompanied Columbus on his third voyage to America. In 1502 Don Nicolas Ovando was sent as governor to St. Domingo, and Las Casas accompanied him, where he was ordained to the priesthood in 1510, and the following year proceeded to Cuba to pacify the island. His work in behalf of humane treatment of the Indians did much to alleviate their pitiful condition, and he inaugurated a number of reforms in the application of slave labor, which he endeavored to suppress. His efforts were also extended to a project for the purpose of planting Spanish colonies, but, failing in this, he sailed to Spain and later returned to America to spend a number of years in missionary work, visiting Mexico, Guatemala, Nicaragua, and Peru. In 1544 he became bishop of Chiapas, in which position he effected many reforms of material value to the natives, but, when Charles V. revoked laws favorable to the material improvement of the natives, he resigned. Though opposed to slavery, he advocated the importation of African laborers to supply Cuban planters for the reason that he deemed them more capable of discharging the work required than native Indians. He also advocated peaceful procedure, designating war as unjust and destructive to the best interests of the island. His greatest work is "General History of the Indies." He died in a convent at Madrid after returning to Spain.

LASSALLE (lä-säl'), **Ferdinand**, socialist and economist, born in Breslau, Germany, April 11, 1825; died Aug. 31, 1864. He descended from a Jewish family of merchants, studied at Breslau and Berlin, and attained a reputation for remarkable native ability and strength of mind. At Berlin he met Humboldt and at Paris formed the acquaintance of Heine, both of whom were attracted by his remarkable progress in philosophy and philology. In 1845 he championed the cause of Countess Harzfeldt, who had become separated from her husband, and after some time forced a favorable compromise. Favoring the Revolution of 1848, he was imprisoned for his democratic expressions. In 1858 he published a treatise on the philosophy of Heraclitus and in 1861 a work on the philosophy of law, entitled "System of Acquired Rights." Subsequently he issued many pamphlets, delivered lectures on the labor question, and organized the social-democratic party of Germany. The Universal German Workingmen's Association was founded by him at Leipsic, and other similar organizations were promoted in different parts of Germany. His work, "Italian War and the Mission of Prussia," was circulated extensively, and had its influence in withholding support from Austria in its war with France. A duel fought near Geneva caused him to be severely wounded on the morning of Aug. 28, 1864, from the effect of which he died a few days later.

LASSO (läs'sō), a long line with a running noose, used chiefly in Spanish America, Mexico, and in the western part of the United States for catching horses and cattle. It is usually made of rawhide, but also of sisal rope and hair. One end of the lasso is attached to the saddle, while the other has a sliding noose formed by rings, which the horseman throws over the head or around the foot of the animal while in full gallop, and thus succeeds in catching the desired animal. In the United States it is frequently called a lariat and in Mexico a la reata.

LAS VEGAS (läs vā'gäs), county seat of San Miguel county, New Mexico, on the Pecos River, forty-four miles east of Santa Fe. There are good railroad facilities, a large transportation trade in wool and live stock, and in the surrounding country are productive gold and silver mines. The city has electric lights, good schools, and is the seat of a normal school. In its vicinity are the Las Vegas hot springs, whose waters are noted for their curative effects. Population, 1900, 3,552.

LATERAN (lăt'ẽr-an), a celebrated church in Rome, Italy, founded by Constantine the Great and by him dedicated to the Savior, but rebuilt in the 12th century by Lucius II. and dedicated to St. John Lateran. It served in the original form up to 896, when it was destroyed by an earthquake, but was rebuilt shortly after and has been remodeled many times. The palace annexed to it served as the papal residence until the 14th century, but is now in possession of the Italian government. The Scala Santa, or Holy Staircase, which is reputed to have served in the house of Pilate at Jerusalem, and to have been trod by our Lord as he passed to judgment, is preserved in the piazza of St. John Lateran.

LATHROP, George Parsons, editor and author, born in Honolulu, Hawaiian Islands, Aug. 25, 1851; died in New York City, April 19, 1898. He was educated in

Germany, and in 1871 married Rose, second daughter of Nathaniel Hawthorne. In 1875-77 he was editor of the "Atlantic Monthly," and afterward edited the "Boston Courier." Besides editing the works of Nathaniel Hawthorne, he published "Study of Hawthorne;" "Rose and Roof-tree;" "Echo of Passion;" "Dreams and Days," and "Story of Courage."

LATIMER (lăt'ĭ-mer), **Hugh**, reformer and martyr, born at Thurcaston, in Leicestershire, England, in the year 1490; suffered martyrdom, Oct. 16, 1555. He studied at Cambridge, was elected a fellow of Claire in 1510, and in 1523 was ordained priest at the university. Soon after he embraced the reformed doctrines, became chaplain to Henry VIII. in 1530, and in 1534 bishop of Worcester. Continuing the work of reform, he was imprisoned at the Tower at various times, but in the reign of Edward VI. attained to popularity at court, though after the death of Edward his earnest religious work was checked. In 1554 he and others, including Cranmer and Ridley, were tried by a council at Oxford, and he was confined in a jail more than a year. Commissioners passed judgment upon him and Ridley, and the two suffered martyrdom in 1555. Latimer was a plain man, cheerful in disposition, noble in qualities, and as a preacher of the gospel brave and energetic.

LATINS, the inhabitants of ancient Latium, in Italy, and from whom the language of Rome was obtained. These people were of great antiquity, and their distinguished leader, Ascanius, son of Æneas, aided in building the town of Alba Longa, which was the most important of their cities. Since Rome was held as a colony of Alba Longa, the Latin language was adopted by the Romans.

LATITUDE (lăt'ĭ-tūd), in geography, the term applied to distance measured north and south from the equator, reckoned in degrees and measured along the meridians. Latitude at the equator is the smallest or lowest and is marked 0°, and distance from it is designated north or south respectively as the locality is north or south from the equator. Since there are only 360° in any circle, and the distance from the equator to the poles is one-fourth of any entire circle, 90° is the greatest value of latitude a place can have, thus the poles are each marked 90°. There may be any number of parallel circles imagined drawn between the poles and the equator, these being designated parallels of latitude, and, if their distance in degrees from the equator is known, it is not difficult to locate a place in latitude. When the longitude of a place is associated with its latitude, an exact locality on a sphere or map may be designated. See **Longitude.**

LATTER-DAY SAINTS, or Reorganized Church of Jesus Christ of Latter-Day Saints, a body of the Mormon Church, which stands in opposition to the Mormons that have their principal seat of activity at Salt Lake City. It dates from 1844, when a schism occurred in the church, immediately after the death of Joseph Smith, and its promotors claim succession from the original organization. Its chief institutions are at Lamoni, Iowa, where the principal officials reside and several fine educational institutions are maintained. The tenets of faith are founded upon the Bible and the Book of Mormons, both of which are held to be inspired, plurality in marriage is opposed, and strict discipline is enforced. There are 1,450 ministers, 650 churches, and a membership of 50,560. See **Mormons.**

LAUD (lawd), **William**, archbishop of Canterbury, born in Reading, England, Oct. 7, 1573; beheaded on Tower Hill, Jan. 10, 1645. He studied at Oxford, where he took a degree in 1598, and in 1601 was ordained a priest. His profound learning and industry gained many friends, and, after holding several important educational positions, he became chancellor of Oxford in 1630, and in 1633 archbishop of Canterbury. It was designed to establish the Church of England as a branch of the Catholic, and with this intent he entered upon the plan of forcibly abolishing Puritanism. The Puritans were hunted down by spies, and fines were levied on all those who dissented from his church, while many were imprisoned and exiled. Active armed hostilities commenced when vigorous efforts were inaugurated to destroy Presbyterianism in Scotland, and soon after the long parliament controversy began. This parliament met in 1640, impeached Laud for high treason, and he was sent to the Tower and kept in confinement for three years. The house of lords deferred judgment for a long time, but on Dec. 17, 1644, he was declared guilty of high treason and of seeking to overthrow the Protestant religion. On account of these charges he was beheaded, though previously he had been given opportunities to escape. The first complete edition of his works was published in six volumes at Oxford in 1847-49, entitled "Library of Anglo-Catholic Theology."

LAUDANUM (la'dà-nŭm), the name applied to several tinctures of opium, containing about thirty-three grains of the soluble matter of opium, or 3.3 grains of morphine, to each fluid ounce of the tincture. Its strength is increased by exposure to evaporation, when it becomes quite thick.

LAUGHLIN (lăf'lĭn), **James Laurence**, economist, born in Deerfield, Ohio, April 2, 1850. After attending the public schools, he studied at Harvard University, where he graduated in 1873. In 1878 he became instructor of political economy at Harvard, in 1890 professor at Cornell, and in 1892 was elected to the chair of political economy in the Chicago University. He is noted as an advocate of the single monetary standard, and in 1895 discussed that proposition with

W. H. Harvey, the author of "Coin's Financial School." His writings embrace "Elements of Political Economy;" "History of Bimetallism in the United States," and "Facts About Money."

LAUGHTER (läf'tẽr), the expression of mirth, merriment, and satisfaction by laughing. It is a sound or succession of sounds produced by a deep inspiration, followed by vocalized expulsions of air in quick interrupted succession. Laughter is caused by things of an apparent or real ludicrous nature and by tickling, and also accompanies extreme grief and hysteria. Since there is an intimate connection between the muscles of the eyelids and some of the muscles of the upper lip, in laughing, as in weeping, the eyelids are more or less contracted.

LAUREATE (la'rē-ăt), **Poet**, an honorary office maintained in England, in which the poet regarded official is invested with the title of laureate by the crown. The recognition of a poet laureate originated from various sovereigns who engaged singers. Among the early kings employing singers were Henry I., Richard I., Edward I., and Edward II. The term laureate itself arose from the laurel wreath given at the universities for marks of excellence in study, and also to men of notable poetic ability. Originally the title implied service, as the writing of an ode for the king's birthday and on festival occasions, particularly those celebrated after noted national victories. However, special duties have not been connected with the office subsequent to the reign of George III. The following have been poets laureate since the definite establishment of the office: Edmund Spenser, 1591-99; Samuel Daniel, 1599-1619; Ben Jonson, 1619-37; William Davenant, 1660-68; John Dryden, 1670-89; Thomas Shadwell, 1689-92; Nahum Tate, 1692-1715; Nicholas Rowe, 1715-18; Lawrence Eusden, 1718-30; Colly Cibber, 1730-57; William Whitehead, 1757-85; Thomas Warton, 1785-90; Henry James Pye, 1790-1813; Robert Southey, 1813-43; William Wordsworth, 1843-50; Alfred Tennyson, 1850-92; Alfred Austin, 1896–. It will be noted that interregnums occurred in 1637, 1668, and 1892.

LAUREL (la'rĕl), a genus of plants ranging in size from a shrub to trees sixty feet in height. They are natives of southern Eurasia and northern Africa, but have been acclimated extensively in different countries. Several species are cultivated as ornamental plants, and for their fine aromatic fragrance. The leaves are lanceolate and evergreen, the flower yellowish-white, and the fruit about an inch long and of a bluish-black color. The flavor of the leaves is utilized in culinary arts, and also as a stimulant and carminative in medicine. Several oily substances are extracted from the leaves and the fruit, such as oil of sweet bay and oil of laurel. Laurel water is obtained by distillation from the leaves. In America the name is given to several native plants, including those known as the cherry laurel and purge laurel, but of the true laurel there is properly but one species. The true laurel and

LAUREL.

the noble laurel are somewhat similar in their evergreen foliage, but differ botanically. Wreaths and crowns were made of laurel twigs in ancient times by the Greeks, and these adorned the heads of poets and heroes.

LAURENS (law'renss), **Henry**, statesman, born in Charleston, South Carolina, in 1724; died there Dec. 8, 1792. He descended from a Huguenot family, secured a liberal education, and rapidly amassed a fortune in commercial enterprises at Charleston. In 1777-80 he was a delegate to the continental congress, serving as its president several years, and in 1779 was appointed minister to Holland. While on his way to Europe, he was captured by the British, and confined for fifteen months as prisoner in the Tower. He was appointed afterward as a peace commissioner with Jay and Franklin, and in 1782 signed the preliminary treaty of Paris by which peace was restored with England. Subsequently he retired to a plantation near Charleston. It was especially provided in his will that his body be cremated, which was done, this being the first cremation on record in America.

LAURENS, John, soldier and patriot, born in Charleston, South Carolina, in 1756; slain in battle, Aug. 27, 1782. He was the son of Henry Laurens, was educated in England, and in 1777 became an aide to Washington, serving with that general in all the battles of the Revolution in which the latter commanded. Washington dispatched him to France in 1781 for the purpose of obtaining aid in money and supplies, but he returned in time to participate in the battle of Yorktown. While in active service under General Greene, in a battle on Combahee River, South Carolina, he was mortally

wounded. His correspondence was published in Boston in 1867.

LAURENTIAN MOUNTAINS (la-rĕn'-she-an), the mountain range of British America that divides the St. Lawrence basin from the watershed of Hudson Bay, and also separates the upper tributaries of the Mackenzie from the streams flowing into the same bay. It extends in an irregular curve from Labrador to the Arctic, a distance of about 3,000 miles. The highest peaks are 4,000 feet, the average height 1,500, and the principal rock formations belong to the archæan system.

LAURIER (lo'ri-ā), **Wilfrid**, statesman, born in St. Lin, Quebec, Nov. 20, 1841. He was educated at L'Assomption College, received a degree from McGill University in 1864, and became queen's counsel in 1890. From 1871 to 1874 he served in the Quebec assembly, then entered the dominion parliament, and in 1877 was made minister of inland revenue. In 1891 he became leader of the liberal party, was made premier in 1896, and in 1898 secured an appointment on the Anglo-American joint high commission. Laurier ranks as an able speaker and a strong advocate of progressive legislation. He is reputed one of the most influential French-Canadians. For some time he was editor of "Le Defricheur."

WILFRID LAURIER.

LAVA (lä'vȧ), a term generally applied to all molten matter thrown from volcanoes, whether flowing as a stream or being deposited after movement has ceased. When moving in a molten state within the volcanic channel, it is properly called trap, and after being deposited it forms basalt, trachytic greenstone, or tufa, this depending upon the degree of rapidity with which it cools, the cooling action influencing the formation of hornblende, feldspar, augite, and various other substances. The stream cools and hardens more rapidly on the surface, which causes it to become honeycombed as a result of escaping gases from the interior, while the interior continues to flow in a liquid state for some time; but after the heat escapes it forms a compact mass. The lavas thrown out by Etna and in Labrador are largely feldspar; those of Vesuvius principally green augite and basalt, and those of the Peak of Teneriffe largely trachytic.

LAVAL-MONTMORENCY (lä-väl'-mŏn-mo-rŏn-se'), **Francois Xavier de**, first Roman Catholic bishop of Canada, born in Laval, France, March 23, 1622; died in Quebec, May 26, 1708. He is also known by his family title, Abbe de Montigny, which was applied to him more or less frequently both in America and Europe. He studied at the college of La Fleche, took a course in theology at Paris, and was ordained priest in 1646. In 1658 he was consecrated as bishop of Quebec, and the following year reached New France, where he organized parishes and vigorously prosecuted religious work. He consecrated the Church of Notre Dame in 1666, and about the same time established a preparatory college and a seminary for the education of priests. In 1675 he laid the foundation of the Seminary of the Holy Family, and to this gave his property. He resigned the administration of his diocese in 1684, when he retired to the seminary he had established, and his name is commemorated at Quebec in Laval University. Laval was a man of pure and devoted character; an upright advocate of the religious cause.

LAVATER (lä-fä'tĕr), **Johann Kaspar**, German author and physiognomist, born in Zurich, Switzerland, Nov. 15, 1741; died there, Jan. 2, 1801. He studied in his native city, where he became interested in literature by studying the works of Klopstock. In 1762 he became widely known by opposing oppressive measures of government, and in 1767 published a volume of poems entitled "Swiss Songs." This was followed in 1773 by a religious work of three volumes known as "Prospects of Eternity," which went through a number of editions. As a preacher of the Protestant faith he took very high rank, being promoted to various charges until in 1786 he was called as minister to the St. Peter Church at Zurich. As a forceful pulpit orator and writer he was highly influential, his sermons and other writings receiving a wide reading, and as an advocate of religious liberty his influence spread throughout Germany and had a marked effect in the French Revolution. By a keen force of observation he established many principles of physiognomy, and was able to discriminate character with remarkable certainty. His work, entitled "Physiognomical Fragments," has been widely translated as an authoritative work on the subject. His death resulted from a wound received while attending wounded soldiers in a battle at Zurich, on Sept. 26, 1799, which caused him to suffer severely about fifteen months. One of his early precepts was, "Limit yourself at every moment, if you can, to what is nearest to you." Among his writings not named above are "Pontius Pilate" and "Aphorisms on Man."

LAVENDER (lăv'ĕn-dĕr), a genus of plants native to southern Europe and western Africa, but now widely naturalized and cultivated. They grow as shrubs from two to four feet tall, have hoary leaves, grayish-blue flowers, and are prized for their fragrant, volatile oil contained in the flowers and used in perfumery. The oil has a bitter

principle, is of a pale-yellow color, and is obtained by distilling the flowers with water. Besides its use in perfumery, oil of lavender is employed successfully as a stimulant in colic, hysteria, and other affections. Lavender water is a toilet preparation, and is secured by dissolving oil of lavender with musk, cloves, otto of roses, bergamot, and other oils in spirits; while spirit of lavender is obtained by distilling fresh flowers in rectified spirits. A species of broad-leaved lavender yields an oil used in preparing varnishes and ornamenting porcelain products. The American perfume known as Florida water is prepared largely from lavender. Lavender is cultivated most largely in Europe, where it is used for the distillation of its essential oil and for marketing the flowers. Considerable quantities are grown in the United States, particularly in Pennsylvania, New Jersey, and on the Pacific coast.

LAVOISIER (lä-vwä-ze-ā'), **Antoine Laurent**, celebrated chemist, born in Paris, France, Aug. 26, 1743; guillotined May 8, 1794. He became a specialist in chemistry, studying under Rouelle at Paris. In 1766 he was awarded a gold medal in a prize contest. He contributed many masterly analyses of chemical compounds to the Academy. In 1768 he was made an associate of the Academy, was appointed to the position of farmer-general of taxes in 1769, and in 1776 announced several valuable discoveries in relation to the manufacture of gunpowder. About that time he also discovered the existence of oxygen, made valuable progress in chemistry by the analysis of water, and led to the dissemination of knowledge of the composition of inorganic and organic substances. On May 2, 1794, he and other former tax collectors were accused before the convention, and the prejudice that existed against that class of former officers led to his guillotining. He is the author of many excellent works relating to chemistry and astronomy, the most celebrated being "Treatise of Elementary Chemistry," which was published in two volumes in 1789.

LAW, John, financier, born in Edinburgh, Scotland, April 21, 1671; died in Venice, Italy, March 21, 1729. He was the son of a goldsmith. At the age of twenty years he went to London, but on account of a duel, in which his opponent was killed, he removed to Amsterdam. While there he studied the commercial and financial aspect of Europe, and in 1700 returned to Edinburgh, which was then in a state of excitement on account of the unsuccessful Darien expedition of 1695-1701. He immediately entered upon a plan to secure the adoption of paper currency by the Scottish parliament, but failed. After traveling through Europe, he established a banking house in Paris as a result of successful gambling enterprises, and induced the duke of Orange, regent of France, to adopt his system of paper currency in 1718, which circulated at par, though bonds of the government were at a discount. The following year he inaugurated his celebrated Mississippi Scheme, an enterprise designed to develop the Mississippi valley. His immediate success caused him to attain much popularity, and he was made counselor of state and comptroller-general of finance. Later, however, his scheme collapsed, and he was compelled to flee from France, after which he became a common gambler and settled in Italy.

LAWRENCE (lär'ens), a city in Kansas, county seat of Douglas county, on the Kansas River, twenty-eight miles southwest of Leavenworth. It is the focus of a number of important railroads, and has a growing trade in produce and merchandise. The surrounding country is agricultural. It is noted as an educational center, having fine facilities for instruction. The manufactures embrace barb wire, cigars, carriages, furniture, earthenware, flour, shirts, paper, and machinery. It is the seat of the University of Kansas and Haskell Institute, the latter being one of the most important institutions for the education of Indians in the United States. The general facilities embrace a public library, street railways, pavements, and waterworks. The city has excellent school and church conveniences. Population, 1900, 10,862.

LAWRENCE, an important city of Massachusetts, in Essex county, noted as a manufacturing and railroad center. Its situation on the Merrimac River is convenient, being twenty-five miles from its mouth and twenty miles north of Boston. There is a large trade in merchandise, fruits, and cereals. It is connected by electric railways with many adjoining cities, has good schools, and supports numerous religious and scientific institutions. The manufactories employ 6,500 persons. They produce cotton and woolen goods, steam engines, boots and shoes, clothing, paper, hats, and machinery. Immense water-power is obtained from the Merrimac, which has caused its manufacturing establishments to rank among the largest in the world. The city has a number of fine public buildings and many excellent residences. Population, 1900, 62,559.

LAWRENCE, Abbott, merchant and philanthropist, born in Groton, Mass., Dec. 16, 1792; died in Boston, Aug. 18, 1855. In 1814 he formed a partnership with his brother Amos, the partnership being known as A. & A. Lawrence. The firm conducted a large domestic and foreign commission trade in cotton and woolen goods, and accumulated a vast fortune. Abbott was elected to congress in 1838, where he served in 1839-40, and in 1849-52 was United States minister to Great Britain under appointment of President Taylor He also served on the commission that settled the northeast

boundary in 1842, and as a commissioner to settle the fishery question. At Harvard University he established the Lawrence Scientific School by bequeathing $100,000 for that purpose, gave Harvard $50,000 for the erection of model lodging houses, and made liberal donations to the Lawrence Academy.

LAWRENCE, Amos, merchant and philanthropist, brother of Abbott Lawrence, born in Groton, Mass., April 22, 1786; died Dec. 31, 1852. He began his commercial career by clerking in a dry goods store, and in 1814 formed a mercantile partnership with his brother. The firm established a cotton mill at Lowell in 1831. It became highly successful in its foreign trade. Amos gave about $700,000 for charitable and educational purposes. His donations were to the Lawrence Academy, Child's Infirmary at Boston, and $10,000 for the completion of the Bunker Hill Monument. Other donations were made to the Theological Seminary at Bangor, Kenyon and Williams Colleges, and the Lawrence University in Wisconsin. His "Life and Correspondence" was published by his son in 1855.

LAWRENCE, James, naval officer, born in Burlington, New Jersey, Oct. 1, 1781; died June 5, 1813. He became lieutenant in 1802, distinguished himself in the war with Tripoli, and in 1811 became captain of the Hornet. In the engagement off the mouth of the Demerara River, British Guiana, in 1813, he sank the British brig-of-war Peacock, and for this service received the thanks of congress. He commanded the frigate Chesapeake in an engagement with the British frigate Shannon near Boston, was mortally wounded, and when carried below exclaimed, "Don't give up the ship." A monument was erected to his honor in Trinity Churchyard. Captain Lawrence evinced the utmost courage in naval engagements. He was dignified and commanding in appearance.

JAMES LAWRENCE.

LAWRENCE, Sir Henry Montgomery, soldier and statesman, born in Matura, Ceylon, June 28, 1806; died July 4, 1857. He joined the Bengal artillery stationed near Calcutta in 1823, took part in the Burmese War of 1828, the Afghan War of 1838, and the two Sikh wars in 1845 and 1848. In 1857 he was appointed by Lord Canning as commander at Lucknow and while there was wounded by a shell, from the effects of which he died. Lawrence was a military leader of much ability and likewise a philanthropist, having founded military asylums at Rajputana, Madras, and in the Punjab. At St. Paul's Cathedral is a statue in his honor.

LAWRENCE, Saint, celebrated martyr of the early church, probably born at Huasco, Spain, in the beginning of the 3d century, martyred Aug. 10, 258. He was a deacon of Rome under Sixtus I. in the 3d century. According to legend he was summoned by the persecutors of Emperor Valerian before the prætor, and a demand was made to deliver the church treasures. In response he brought forward the poor and sick, declaring them his treasures, and after persistent refusal to turn over the church valuables he was roasted on a gridiron. A church was built to his memory by Constantine the Great. August 10 is designated as his feast.

LAWRENCE, Sir Thomas, portrait painter, born in Bristol, England, May 4, 1769; died in London, Jan. 7, 1830. He began sketching in crayons at the age of ten years, and became a student at the Royal Academy at eighteen. In 1791 he was elected an associate of the Academy, and to full membership in 1798. The prince regent knighted him in 1815, and five years later he became president of the Royal Academy, succeeding Benjamin West. Besides painting the portraits of many prominent Englishmen, he was employed at Vienna and other European cities. "The Transfiguration" is his most noted work in crayon.

LAWRENCEBURG, county seat of Dearborn county, Indiana, situated on the Ohio River, eighty miles southeast of Indianapolis. It has good railroad facilities and a considerable trade. The surrounding country is agricultural. Its manufactures include musical instruments, spirituous liquors, machinery, flour, furniture, coffins, and pumps. Population, 1900, 4,326.

LAWTON, Henry W., soldier, born in Toledo, Ohio, March 17, 1843; killed at San Mateo, in the Philippines, Dec. 19, 1899. He entered the Union service in 1861 and served through the Civil War. He secured several promotions for gallant service, and was granted a medal of honor for valuable aid at Atlanta in 1864. In 1865 he was brevetted colonel of volunteers, made second lieutenant the next year, and in 1888 was promoted to the rank of major. The following year he became lieutenant-colonel, and in 1898 served as brigadier-general in the army of invasion sent to Cuba, taking a prominent part at the battle of El Caney, after which he was made a colonel. In December, 1898, he was sent to the Philippines, where he captured Santa Cruz the following year, and had command of the lines in Morong province about Manila. He was fatally wounded while making an attack upon intrenched Filipinos, and was the first American general to fall in the war.

LAYARD (lā'ard), **Sir Austin Henry,** traveler and diplomatist, born in Paris, France, March 5, 1817; died July 6, 1894.

He descended from well-to-do parents, spent his early life in Italy, and studied law in Paris and London. In 1839 he started on an overland tour to Ceylon. He began excavations on the site of Ninevah in 1845, having secured a fund of $15,000 by vote of parliament, and sent to the British Museum many relics of historic interest. About the same time he published "Ninevah and its Remains" and "Monuments of Ninevah." In 1852 he became a member of parliament, was undersecretary of foreign affairs in 1861-66, and was appointed ambassador to Madrid in 1869. Under Lord Beaconsfield he became ambassador to Constantinople in 1887. Among the honors bestowed upon him are degrees from Oxford and Aberdeen universities, and an election as honorary foreign secretary of the Royal Academy of France.

LAZZARONI (lăz-zȧ-rō'nĭ), a name applied to the fishermen and boatmen of Naples, Italy, but formerly used to designate all persons destitute of visible means of support. The name became connected with those occupying the hospital of St. Lazarus, an institution of refuge. Formerly they included a large class who were prominent factors in the revolutionary movements of Naples, and under their leader conducted a prominent revolt against the Duke d' Arcos on July 7, 1647.

LEA (lee), **Henry Charles**, author and publisher, born in Philadelphia, Penn., Sept. 19, 1825. He entered the publishing house of his father at an early age, later became its principal, and devoted much time to literary research. During the Civil War he organized a system of municipal bounties to encourage enlisting in the Federal army. He donated $50,000 to the Philadelphia library and gave support to other institutions. His principal works include "Chapters from the Religious History of Spain;" "Superstition and Force;" "History of the Inquisition;" "Essays on the Wager of Battle;" "Indulgences in the Latin Church," and "Ordeal and Torture."

LEAD, a highly useful metal. It is bluish-white in color and possesses a brilliant luster when newly cut, but after exposure to the air becomes dull on account of taking on a coating of carbonate of lead. Lead possesses both ductility and malleability, but the former is less than that of all other ductile metals, while the latter is considerable. It is flexible, soft, inelastic, melts at 615° Fahr., and has a specific gravity of 11.37. The lead of commerce is mostly obtained from the native lead sulphide, which occurs in veins. It is extracted from the native ore by roasting in a furnace with one-twentieth part of lime, and allowing free access of air. Lead occurs as a constituent of many minerals, and in a native state is associated with others. In separating it from other metallic substances the ore passes through several stages, and the sulphurous constituents are finally yielded up. If the lead still contains silver, copper, and antimony after the process of reduction, it is run off and repeatedly crystallized, a treatment under which the silver is concentrated. Antimony is the principal impurity, and is burned off by a process of roasting in a reverberatory furnace. The lead of commerce is often nearly pure, and it can be obtained in a perfectly pure state by the reduction of the pure nitrate. Lead is used for type-metal, plumber's solder, pewter, water pipes, gutters, and for forming various alloys. Owing to its being the softest of metals, it is rarely used in the pure state, except for special purposes. In manufacturing type-metal it is alloyed with antimony. Pewter is a hard alloy consisting of four parts of tin and one of lead. Tin is alloyed with lead in preparing solder, and also in brittania metal and various others.

In the United States lead is obtained largely from the argentiferous ores, that is, from the ores bearing silver, and is produced largely in Colorado, Utah, Idaho, and Montana. There are also extensive lead mines in the Mississippi valley, where it occurs largely with zinc. The production of the United States aggregates annually 270,000 tons, of which about one-fourth is exported. Lead is one of the most widely distributed of the metals and occurs in all the grand divisions, but the products of Europe are the most important aside from those of North America. Most commonly lead is found in galena ore. Carbonate and other salts of lead are unmetallic in appearance, and occur in primitive and secondary rocks. There are several oxides of lead, among them red oxide and plumbic oxide, which serve useful purposes in the arts. Litharge is a protoxide, and is produced by burning lead in a current of air. Dioxide or brownoxide is obtained by subjecting red lead to diluted nitrate acid or chlorine water. White lead is derived from carbonate of lead and is a basis for pottery glazes, cement, and white oil paint. Carbonate of lead and salts of lead are poisonous, and give rise to so-called lead poisoning in persons engaged in painting and the manufacture of white lead. That lead is one of the earliest known metals is evidenced by the fact that it is mentioned in the Books of Moses. It is also spoken of by Pliny. Many of the articles made by the ancient Romans, Greeks, and Phœnicians still preserved in museums, such as rings, portions of pipes, and weights, contain lead or are made wholly of lead.

LEAD (lēd), a city of Lawrence county, South Dakota, situated in the Black Hills, about three miles south of Deadwood. It is the junction of several railroads, has modern municipal facilities, and near it is one of the largest gold mines in the world. Besides being an important trade and mining center, it has good schools. There are manufactures of cigars, utensils, machinery, and

jewelry. It has a number of fine buildings. Population, 1900, 6,210.

LEADVILLE, a city of Colorado, in Lake county, near the source of the Arkansas River. It is located in a rich silver-producing country, which also has gold deposits, and contains excellent railroad advantages. There are manufactures of ironware, machinery, cigars, and clothing. The site of the city is very beautiful, and near it are many canons and other natural formations of interest. It has fine public schools and churches, waterworks, pavements, and street railways. Population, 1900, 12,455.

LEAF, the organ of a plant that grows from the axis or stem, but sometimes also from the root. Leaves are flat and thin, green in color, and constitute the foliage. They never develop into flowers, but exhibit an endless variety of forms in different plants, and constitute marks by which to distinguish easily the different species. A complete leaf consists of a blade or limb, a leaf stalk or petiole, and a pair of stipules at the base. Many leaves have no stipules, and some no petiole. In the latter case the leaf is said to be sessile. Simple leaves consist of one piece, while compound leaves have more than one piece or blade. The leaves are composed of two kinds of material, woody fiber and cellular tissue; the former constitutes the frame work that gives strength to the blade, and the latter forms the green pulp of the leaf. The frame work spreads in various directions and constitutes the ribs, from which branch veins and veinlets, these serving to convey the sap. One side of the leaf is turned upward to the sky, and the other toward the ground, each being covered above and below with so-called surfaces or skins. The stomates or pores are on the lower surface and act as breathing organs to take in essential elements from the air, but the leaves also give out a purified air laden with oxygen, which serves a useful purpose in the maintenance of animal life. Plants of the same species have the same kind of leaves, and these are arranged in an exactly similar way on the stems, being an expansion of the bark and a node of the stem. The arrangement is either opposite or alternate on the stem, but greatly variegated in different species.

LEAF INSECTS, the name of numerous species of insects remarkable for their resemblance to the leaves of plants on which they feed. The similarity is not only in color, but also in size and in the resemblance of their legs to the ribs and veins of the leaves. Insects of this character are native to tropical countries, occurring in South America, Australia, and portions of Africa. Their main protection against enemies consists in their resemblance to the leaf forms about them, since they are almost incapable of flight.

LEANDER. See Hero.

LEAP YEAR, a year to which one day is added, being distinguished from others in that it contains 366 days. Every year exactly divisible by four is a leap year, except that only every fourth year ending a century is thus classed. This exception is made to correct the error arising from the addition of one day in four years to the year over the true length of the year. Thus 1800 and 1900 were not leap years, but 1200 and 1600 were, and 2000 will also be so classified. For a considerable time centuries divisible by 400 will be leap years.

LEATHER, the tanned, tawed, or otherwise dressed skin or hide of an animal. The process is applied to the skins of different animals for the purpose of making them tough and pliable, and also to prevent them from putrifying. Some sort of process was applied to the skins of animals very early in history, which was but the result of the practice of ancients in using skins for clothing and in the construction of tents, boats, and implements of war. The fact that the Egyptians developed much skill in the production of leather is evident from the remnants found among ruins, and which appear to date about 1,000 years before the Christian era. That bark is serviceable for tanning was discovered, in all probability, by mere accident, but it has furnished the principal means and is still used quite extensively in many countries. Other processes are by tawing with bichromate of potash, alum, and various mineral salts, and by shamoying or treating the skins with oils.

Commercially leather is distinguished from skin and pelt, the former being the skin of an animal dressed with the hair or fur remaining intact, and the latter being untanned skin or hide. Leather is made most commonly from the skins of cattle, though those of swine, horses, asses, sheep, camels, and goats are utilized. When shipped from a long distance, hides reach the tannery in a cured or salted condition, but others are transported without curing. The first process is to unhair the skins, which is done by means of lime, but also by a process of sweating; in the latter case a partial putrefaction takes place, and the hairs are removed without injuring the hide. In some tanneries the skins are unhaired by sulphide of sodium, sulphide of arsenic, and other alkaline sulphides. The loosened hairs are removed by scraping, but machines for unhairing have been adopted in the larger tanneries. The next process is to remove the loose flesh by scraping and brushing, after which the hides are separated according to the class of leather desired. After soaking in water and washing out all particles of hairs, lime, and other matters, the skins are placed in a tan-pit, in which a weak tanning solution is confined. In this they are turned several times daily, and successively moved to pits containing stronger solutions, until placed in the final pit, where they remain for about six weeks. After this process

they are taken out and beaten to give them hardness, when they are oiled and prepared for the market.

The various grades of leather are prepared differently, being pared, rolled, and then given smoothness by treatment, the latter being effected under a process of oiling. This is true also of japanned leather, which, in the process of manufacture, is stretched on wooden frames and successive coats of varnish are applied, each of which is allowed to dry and then is rubbed down with pumice stone. Russia, morocco, and seal leather are other grades of highly finished products, but none of these has any connection with the locality or name applied, except as a recognized grade. The skins of lambs, kids, sheep, and goats are tawed, and are used for light shoes and gloves. Shamoying is applied to shamois skins, being done by oil, but the so-called shamoy of the market is largely split-leather. Electricity was first applied in tanning in Sweden. Under the electric process hides may be completely tanned in from forty to ninety hours. The plan is to suspend hides in tanning liquor between two copper plates and apply an electro-motive force of fifty volts and a strength of one hundred amperes. However, the time required for the process depends upon the strength of the tan-liquor, but it has been well established that sole-leather cannot be prepared by rapid action for the reason that it requires a slow process to tan thick hides. There are various more or less rapid tanning processes, but the best results require considerable time.

LEAVENWORTH (lĕv'ĕn-wŏrth), a city in Kansas, county seat of Leavenworth county, on the Missouri River, twenty-five miles northwest of Kansas City. It is an impŏrtant railroad center, has a good sewerage system, city waterworks, electric street railways, street lights, and substantial pavements. The school system is thoroughly organized. It is the seat of a soldiers' home, state penitentiary, and numerous other public institutions. The important manufactures include glucose, furniture, wagons, engines, iron bridges, cigars, clothing, machinery, shoes, and earthenware. Coal mines are situated in the vicinity. Near the city is the extensive military establishment of Fort Leavenworth, being immediately north of the city. Population, 1900, 20,735.

LEBANON (lĕb'ą-nŏn), a city in Pennsylvania, county seat of Lebanon county, situated in a rich coal and iron producing region, and connected by important railways with other trade centers. It has electric lights and street railways, pavements, public libraries, and good schools. There are important manufactures of machinery, engines, railway cars, organs, cordage, furniture, and farming implements. The city has an extensive trade in merchandise. Population, 1900, 17,628.

LEBANON MOUNTAINS, the name of two mountain ranges in the northern part of Palestine. They trend in almost parallel lines from northeast to southwest, and enclose between them the Nahr Litany valley, anciently known as the Cœle-Syria valley. The western range is called Lebanon and the eastern Anti-Lebanon, but the former is known in modern geography as Jebel-Libnan and the latter as Jebel-esh-Shurky. However, the western range is the more elevated, its highest peak being El-Kazib, which attains a height of 10,020 feet above sea-level. The Anti-Lebanon range is comparatively irregular, but has the most elevated peak of the two ranges, Jebel-esh-Sheikh being 10,985 feet above sea-level. Snow and ice remain in the higher ravines throughout the year, though the slopes are fertile. The cedar forests are famed in history, but they have disappeared largely. A number of streams penetrate the valleys, among them the Jordan River, which has its source in the Lebanon Mountains. A peculiar class of Christians called Maronites occupy the northern district, and in the southern portion are the Druses. The principal occupations of these peoples are the culture of silk, the vine, the mulberry tree, and the rearing of sheep and goats. Considerable quantities of wheat, rye, barley, millet, and tobacco are cultivated, and manufacturing enterprises receive growing attention. The most desirable land is possessed by the monks, who maintain Maronite monasteries, and are influencing the culture and manners of the region. Protestant missions are also gaining a strong foothold.

LEBRUN (lĕh-brŭn'), **Charles**, historic painter, born in Paris, France, Feb. 24, 1619; died Feb. 12, 1690. He studied four years at Rome, and, after being employed by Louis XIV. and other high officials, became first director of the Gobelin tapestry works, in 1662. His best productions include pictures of Alexander's battles and excellent decorations in Versailles. He belongs to the classical school of France, of which he is a very distinguished representative. His most noted work is entitled "Mary Washing the Feet of the Saviour in the House of Simon the Pharisee."

LEBRUN, Marie Anne Elizabeth, painter, born in Paris, France, April 16, 1755; died there March 30, 1842. She developed skill as a portrait painter at an early age, married J. B. P. Lebrun in 1775, and was made a member of the Academy in 1783. During the French Revolution of 1789 she traveled in Europe, visiting Russia, Germany, and Switzerland, and met many celebrated persons, a number of whom engaged her as a portrait painter. Among her productions are portraits of Marie Antoinette, George IV. of England, Lord Byron, Caroline Murat, Lady Hamilton, and Napoleon's sister. Several of her best pictures are now at the Louvre gallery of Paris.

LECH (lĕk), a river of Germany and Aus-

tria. It joins the Danube after a course of 175 miles, at Donauworth. The Lech is historic, particularly because of the battles in which Tilly defended the passage of this stream against Gustavus Adolphus, in one of which the former was slain.

LECKY, William Edward Hartpole, philosopher and historian, born near Dublin, Ireland, March 26, 1838. He graduated at the Dublin Trinity College in 1859, and two years later published "Leaders of Opinion in Ireland," which has been republished a number of times. Soon after he began to devote his entire time to historical research, and in 1886 declared his opposition to the Gladstone home rule policy for Ireland. His writings include "History of the Rise and Influence of the Spiritual Rationalism in Europe;" "History of European Morals;" "History of Ireland in the 18th Century;" "History of England in the 18th Century;" "Democracy and Liberty," and "Political Value of History." He died Oct. 22, 1903.

LECLAIRE, Edme-Jean, political economist, born at Aisy-sur-Armancon, France, May 14, 1801; died July 13, 1872. His early education was limited because he was confined to work on a farm until seventeen years of age, when he learned the trade of a mason, and shortly after went to Paris to engage as a house painter. By careful devotion to his work he soon acquired a lucrative business, employing a large number of workmen, and after carefully studying economic questions adopted the coöperative system of labor. The success attending his enterprises attracted wide attention, and it may be said that to him is due in a large measure the profit-sharing system as applied to the various industries of many manufacturing countries.

LE CONTE, Joseph, geologist, brother of Lewis Le Conte, born in Liberty county, Georgia, Feb. 26, 1823; died in 1891. He graduated at Franklin College, received a degree in medicine at the College of Physicians and Surgeons in New York, and in 1851 accompanied Louis Agassiz on his exploring expedition to Florida. He became professor of natural sciences in Oglethorpe College in 1852, taught chemistry and geology in South Carolina College, and subsequently became professor of natural history and geology in the University of California. He published a number of works on religion and natural sciences, including "Compend of Geology;" "Religion of Science," and "Evolution: Its Nature, Its Evidences, and Its Relation to Religious Thought."

LE CONTE (le kont'), **Lewis**, naturalist and traveler, born near Shrewsbury, New Jersey, Aug. 4, 1782; died Jan. 9, 1838. He studied at Columbia College, took a course in medicine, and, after settling in Georgia, became especially interested in botany. His son, John Le Conte, a celebrated physicist, was born in Georgia, Dec. 4, 1818, and died in California, April 29, 1891. After graduating at Franklin College, he studied medicine in New York. Subsequently he became professor at Franklin College, and later held a like position in the University of California, of which he also became president in 1875. He published "Study of Physical Sciences;" "Physics of Meteorology;" "Nebular Hypothesis," and "Sound-Shadows in Water."

LECONTE DE LISLE (lẹh-kōnt' dẹh lēl'), **Charles Marie**, French poet, born on the island of Reunion, in the Indian Ocean, about 420 miles east of Madagascar, Oct. 23, 1818; died in 1894. He received a liberal education, and after extensive travel located in Paris, France, where he engaged in literary work. His remarkable ability to touch upon the things of nature and bring them into active play upon the finer emotions of the soul make his productions among the most excellent of French writers, and attract the sympathy of a growing circle of readers. Many objects furnished themes for his poems. He also engaged extensively in making translations from the Oriental and Greek languages. His translations include the "Iliad," the "Odyssey," and the works of Æschylus, Horace, Sophocles, Theocritus Hesoid, and Euripides.

LEDYARD (lĕj'ard), **John**, traveler, born in Groton, Conn., in 1751; died in Cairo, Egypt, Jan. 17, 1789. After studying law, he became a student at Dartmouth College with the view of undertaking Indian missionary work, but soon after enlisted in the British army, for which purpose he went as a sailor to Gibraltar, Spain. His roving disposition caused him to be discharged, and he returned to America, but soon after went to England for the purpose of joining the third expedition of discovery organized by Captain Cook. In this expedition he was corporal of marines, and was authorized by the English government to keep a complete diary of the voyage, and in 1787 published an account of it at Hartford, Conn. In 1784 he entered upon a second tour, this time designing to explore the northwest coast of America, but, failing to secure necessary financial aid, he decided to make the trip from Europe. Accordingly he reached Stockholm, Sweden, in 1786, and, after a vain attempt to cross the Gulf of Bothnia, proceeded to St. Petersburg, where he engaged with a Russian expedition to explore Siberia. Among the points of interest visited are Barnaul in southern Siberia, Irkutsk, Lake Baikal, and Yakutsk on the Lena River. In 1788 he returned to Europe and furnished material for many interesting geographic and historic papers. Later he made a tour of northern Africa, his death occurring while in Egypt.

LEE, Ann, founder of the Shakers, born in Manchester, England, Feb. 29, 1737; died at Watervliet, New York, Sept. 8, 1780. On June 1, 1742, she was privately baptized, later became a follower of the Prophetess

Jane Wardlaw, and, after being converted, attained prominence in the Shaker Society, and began to preach in the streets of Manchester. Among the teachings were the doctrine of celibacy; that the second coming of Christ will be in the form of a woman, and that human beings may have constant intercourse with the world of spirits. The earnestness and force with which she preached attracted the attention of large crowds, and she came to be called "Mother Ann." Her followers suffered from mob violence, and she was imprisoned for obstructing the streets. After being released, she claimed that a vision had commanded her to emigrate to America, where the foundation of Christ's kingdom was to be established. Accordingly she and eight of her disciples sailed for New York in 1774. She first proceeded to Albany, but soon after the society settled at Watervliet. By a tour through neighboring towns and New England, a large number of converts resulted, and societies sprang up in various places. When the colonists began to move in favor of the Revolution, a number of the Shakers were arrested because of refusing to take the oath of allegiance, but this they did, not on account of sympathy for the British, but because of their opposition to war. The official title of the denomination is "The United Society of Believers in Christ's Second Appearing," and the adherents are noted for their industry and temperance. All are vigorous workers, engaging most largely in agriculture.

LEE, Charles, American soldier, born in Dernhall, England, in 1731; died in Philadelphia, Penn., Oct. 2, 1782. He received a liberal education in England and in continental Europe, developed a desire for a military life by accompanying his father, Col. John Lee, and in 1751 received a lieutenant's commission and joined General Braddock in America. After the defeat of Braddock he was an active support during the retreat, became captain of grenadiers, and in 1760 returned to England, where he joined Burgoyne in the Portuguese service. Later he served on the Polish staff, under appointment by the king of Poland, in 1769. In 1773 he returned to America, was appointed major-general, and at the beginning of the Revolution sided with the colonists. He took part at the siege of Boston, began the fortifications of New York, and in 1776 defended Charleston against Sir Peter Parker. In the autumn of that year he occupied Northcastle, but disregarded Washington's order to join the main army, and was soon after captured by the British in New Jersey. His British captors at first treated him as a deserter, but congress came to his rescue in holding as hostages six British officers and compelled them to treat him as a war prisoner. In 1858 a document was found by which it became conclusive that Lee intrigued against Washington with the Howes, whereby the American army was to be overthrown. In May, 1778, he was exchanged for General Prescott, after which he was placed in command at Monmouth, and on account of disobedience and disrespect was court-martialed and suspended for a year. Later he wrote a disrespectful note to the president of congress, because of which his commission was revoked, and he died in obscurity. In 1792 Edward Langworthy published the essays and papers left by him under the title "Memoirs of the Late Charles Lee."

LEE, Fitzhugh, American general, nephew of Robert E. Lee, born in Clermont, Virginia, Nov. 19, 1835. He graduated at West Point, served against the Indians, and in 1860 became instructor of cavalry at West Point. However, he joined the Confederate army at the beginning of the Civil War and rose to the rank of major-general. He was wounded at the battle of Winchester, where three horses were shot from under him, and took part in the Virginia campaigns. In 1865 he surrendered to General Meade at Farmville. He was elected governor of Virginia as a democrat in 1886, serving four years in that office, and in 1895 was appointed United States consul-general at Havana by President Cleveland. The duties of this position were discharged with much efficiency, especially during the trying period preceding the Spanish-American War. In 1898 he became major-general of volunteers, and before the close of the year was appointed governor-general of the province of Havana by President McKinley. He has a high reputation as an American, being alike efficient as a military leader and a diplomat.

LEE, Henry, American soldier, born in Stratford, Virginia, Jan. 29, 1756; died in Cumberland Island, Georgia, March 25, 1818. He studied at Princeton College, and became captain of cavalry in 1776. Two years later he was made major of an independent corps, and became known as "Light Horse Harry." His facility and accuracy of movement attracted the favorable attention of Washington, and in 1779 congress awarded him a gold medal for capturing Paulus Hook. Lee was sent to assist Greene in the capture of Augusta, took part in the battles of Guilford Courthouse and Eutaw Springs, and in 1786 became a member of congress from Virginia. In 1792 he was chosen governor of Virginia, commanded the force sent by Washington for the suppression of the Whiskey Insurrection in western Pennsylvania, and in 1799 was selected by congress to pronounce the eulogy in relation to the life and character of Washington. In the resolutions drafted for the occasion he designated Washington as "First in war, first in peace, and first in the hearts of his countrymen." While at Baltimore in 1814 a mob destroyed the office of the "Federal Republican," and, in seeking to counteract the destructive forces, Lee

was seriously injured, from the effects of which he died four years later. He was the father of Gen. Robert E. Lee. His work, "Memoirs of the Wars of the Southern Department of the United States," is an interesting production.

LEE, Richard Henry, statesman and orator, born in Westmoreland county, Virginia, Jan. 20, 1732; died at Chantilly, Virginia, June 19, 1794. He studied in Virginia and England, and, after spending some time in travel, settled in Virginia in 1752, where he came into possession of an estate left by his father. In 1757 he was elected as a delegate to the house of burgesses, where he opposed slavery and proposed a scheme to discourage importation by levying high taxes. He was made collector under the stamp act in 1764, but soon after aroused public sentiment against unjust taxation by the British. Lee originated the idea of a colonial congress, advocating it as a protective means against British oppression. Accordingly the first continental congress assembled in Philadelphia in 1774, of which he became a recognized leader. Besides delivering a number of able addresses against unjust legislation, he prepared an address to Great Britain as directed by congress in 1775. In accordance with instructions from the Virginia house of burgesses, he introduced resolutions on June 7, 1776, which declared "that these united colonies are, and of right ought to be, free and independent states, and that they are absolved from all allegiance to the British crown, and that all political connection between them and the state of Great Britain is, and ought to be, totally dissolved." He was a member of the congress authorized by the articles of confederation, and as such opposed the adoption of the constitution on the ground that it interfered with the power of the states, but accepted the office of senator with the view of securing amendments. Later his prejudice against the constitution was removed largely, and in all of his legislative activities he gave warm support to Washington. He retired from public service in 1792 with the good wishes and high esteem of his countrymen.

LEE, Robert Edward, American general, son of "Light Horse Harry," born in Stratford, Virginia, Jan. 19, 1807; died in Lexington, Virginia, Oct. 12, 1870. He entered the United States Military Academy in West Point at the age of eighteen, where he graduated with high standing in 1829. He married Mary Custis, daughter of G. W. P. Custis, the adopted son of George Washington, in 1832, and by the marriage came into possession of valuable estates on the Potomac and Pamunkey rivers. Subsequently he went on an extended tour of Europe. He was promoted to the rank of captain in 1838, and at the beginning of the Mexican War became chief engineer of the American army invading Mexico. Lee served with distinction at Cerro Gordo, Contreras, Cherubusco, and Chapultepec, but received a severe wound in the last named battle, and soon after was promoted to the rank of colonel. He superintended military studies at West Point in 1852-55, and remained in the service of the Union until April 17, 1861, when Virginia seceded and he became a general in the Confederate army. He operated in Virginia and South Carolina for a year as a subordinate general, but secured supreme command on May 31, 1862, after J. E. Johnston had been wounded at Fair Oaks.

ROBERT E. LEE.

The history of Lee so far as it relates to the Civil War is that of the army of northern Virginia. In the seven days' battles he displayed extraordinary military tact, beat Pope at the second battle of Bull Run, and immediately began his first invasion of the North, in the fall of 1862. At the drawn battle of Antietam, the first invasion ended on the 17th of September, and Lee crossed the Potomac into Maryland for the purpose of threatening Washington, but in moving up the Shenandoah valley into the Rappahannock he was intercepted by Burnside at Fredericksburg, where the latter was defeated, and Lee secured a decided success over Hooker on May 2-4, 1863, at the battle of Chancellorsville. Lee next resolved to invade Pennsylvania with all his available forces, but was met by Meade at Gettysburg, July 1-3, 1863, and defeated, after which he recrossed the Potomac and fell back safely into Virginia. In the spring of 1864 General Grant took the field against Lee. The first engagement between the two generals occurred at the Wilderness in May, and this was followed in rapid succession by the battles of Spottsylvania and Cold Harbor. These engagements were followed by continued manœuvers and confronts, but Lee gradually fell back to Petersburg and Richmond, after which the long sieges of those points began. By a desperate effort General Grant broke through the Confederate defenses on April 2, 1865, and Lee's army was compelled to evacuate Richmond. Soon after he made an attempt to join Johnston, but Grant's army being of superior number gradually hemmed the Confederate forces in close quarters. This resulted in the surrender at Appomattox, April 9, when the Civil War ended. In October, 1865, Lee became president of Washington College, now Washington and Lee University, which position he held until his death. General

Lee was an able military commander, a man of noble character, and much revered and beloved. He edited "Memoirs of the Wars of the Southern Department of the United States."

LEECH, a class of suctorial worms found in bodies of water, marshes, and other moist places. There are many species, most of which inhabit fresh-water ponds, but they are also found in marine waters. The group includes the common horse-leeches, medicinal leeches, green leeches, and a number of other species. The body is composed of from eighty to one hundred rings; most species have a mouth furnished with toothed plates with which they make an incision for sucking blood from animals, and many are parasitic on crustaceans and fishes. In Ceylon the land leeches live among damp foliage and are a common pest, attaching themselves to man and beast. In the colder climates the leeches hibernate during the

LEECH.

winter by burying themselves at the bottom of pools and in marshy lands. The medicinal leeches formerly were used extensively for local extraction of blood in cases where the depletion of venous blood was thought advisable. These leeches are from two to four inches long, have a stomach with elongated pouches, and are capable of holding several times their weight in blood. When the stomach is filled, the leech has sufficient nutritious food for about a year, but may be made to disgorge the contents of the stomach by sprinkling salt on its body, when it is again ready for service. At present leeches are used only to a limited extent and are employed principally in Eurasia, but more or less commonly in other grand divisions.

LEECH, John, artist and humorist, born in London, England, Aug. 29, 1817; died in Kensington, Oct. 29, 1864. He took lessons in sketching from his father, studied with Thackeray at Charter House, and began to publish designs when eighteen years of age. His first works were published as etchings and sketches by A. Pen, Esq., and consisted chiefly of representations of comic characters seen on the streets of London. His reputation rests largely upon the excellent drawings and sketches that appeared in "Punch," his first contribution to that comic journal being made Aug. 7, 1841. The subjects of his sketches are designed to illustrate incidents of political life, fashions, popular follies, scientific tendencies, public gossip, and humorous incidents. Their preëminent fitness attracted world-wide attention. The contributions to "Punch" were largely republished under the titles "Pencillings from Punch" and "Pictures of Life and Character." He also furnished illustrations for Dickens' "Christmas Carol;" "Comic History of England;" Hood's "Comic Annual;" "Comic History of Rome," and various other publications.

LEEDS, an important city of England, situated in Yorkshire, on the Aire River, twenty miles southwest of York. It is the junction of several important railroads. The river is navigable to Leeds and adds materially to the transportation facilities. It is noted for its manufactures of woolen goods, steel and iron products, boots and shoes, machinery, clothing, glass, cotton prints, earthenware, and tobacco. In the vicinity are rich deposits of iron ore, while the surrounding country produces large quantities of cereals, fruits, and vegetables. The history of Leeds covers a period of over 1,350 years. It is the seat of many buildings of historic interest, among them St. Peter's Church. The streets are regularly platted, have pavements, electric street railways, public lighting, and are improved by parks and works of art. It has a fine public library, hospitals, and institutions of higher learning. Besides a large number of religious societies, there are many scientific and educational associations in the city and numerous periodicals. Population, 433,500.

LEEWARD ISLANDS, a group of the Lesser Antilles, situated north of the Windward Islands, and southeast of Porto Rico. The group includes a total area of 702 square miles, a population of 140,890, and as now understood embraces only those belonging to Great Britain. Among the most valuable of the British islands are Antigua, St. Kitts, Nevis, Monteserrat, Barbado, Redonda, and Anguilla. St. John, situated on Antigua, is an important city of 9,875 inhabitants, and Basseterre, St. Kitts, has a population of 9,350. About four-fifths of the inhabitants are Negroes; 5,150 are whites, and the remainder mulattoes. The principal religions are Anglican, Wesleyan, Roman Catholic, and Moravian. Among the chief products are coffee, rum, sugar, tobacco, livestock, cocoa, and tropical fruits. The most important of the islands belonging to Great Britain is Antigua, which has an area of 108 square miles. At present the Leeward islands not belonging to Great Britain include principally the following possessions: French—Marie Galante, Gaudaloupe, Deseada, and St. Bartholomew; Dutch—St. Eustacius and Soba; Danish—St. Croix. The Virgin Islands belong to Denmark and England, and St. Martin to the Dutch and French. Geographers now place the total area of the Leeward Islands at about 4,850 square miles. Gaudaloupe is the most important, having an area of 657 square miles and a population of 170,500.

LEFEBVRE (lẹh-fȧvr′), **Francois Joseph,** French soldier, born at Ruffach, in Alsace, Oct. 25, 1755; died in Paris, Sept. 14, 1820. In 1773 he joined the French army, rose by distinguished service to the rank of brigadier-general in 1794, and was made a marshal by Napoleon at the establishment of the empire. At the siege of Dantzic he rendered efficient aid to Napoleon, for which he was given the title of duke of Dantzic, in 1807. In the peninsular war he captured Bilboa, defeated the British in Spain in 1808, and took part with Napoleon in the Russian invasion. In 1814 he was in command of the left wing of Napoleon's army, resisting the advance of the allies, but when the Bourbons were restored he surrendered and was made a French peer.

LEG, a limb or member of an animal body used for support and locomotion. The larger animals have either two or four legs, and are called bipeds and quadrupeds respectively. Anatomists class the portion of the leg from the body to the knee as the thigh, and the part below the knee as the leg proper. The bone of the thigh is called femur, and the two bones below the knee tibia and fibula, the former being the larger, but both are firmly attached by muscles. The calf of the leg is a muscular mass on the back of the human leg, below the knee, and furnishes ample means for standing and moving in an erect attitude.

LEGACY (lĕg′ȧ-cy), a gift of personal property or money conveyed by will and differing from a devise, which is understood to be a gift of real property. In the United States a legacy may be unconditional, or may be subject to some uncertain event or condition. The laws of the different states are somewhat varied, but generally the testator may bequeath in general or specific terms; he may name an executor, and also bequeath in favor of relatives, friends, or for charitable and public purposes. In most countries a limited amount of property may be willed orally in the presence of witnesses, but when the legacy exceeds in value the common limit a written instrument is required. Creditors have a prior claim to legatees.

LEGEND (lĕj′ĕnd), a term formerly applied to certain writings that were designed as lessons in the religious service of the primitive church. These writings contained biographies of saints and martyrs, remarkable stories of religious enterprises, and were intermingled with many valuable precepts encouraging moral conduct and right living. The monastic institutions were prolific centers for the accumulation of these writings, and it was not uncommon to read the histories of saints and martyrs on the particular days set apart for them. Most of these writings originated in the 12th century and spread alike among the Eastern and Western churches, serving the useful purpose of suppressing many of the writings of heathen origin. At present the term legend is understood to imply a narrative, usually entertaining, based on tradition with some intermixture of fact. Many of the popular readings are of legendary origin. They sprang up naturally among the different peoples and embody popular feeling in characteristic narrations.

LEGENDRE (lẹh-zhŏndr′), **Adrien Marie,** mathematician, born in Toulouse, France, in 1752; died in Paris, Jan. 10, 1833. He studied at the College Mazarin in Paris, soon after became professor of mathematics in the military schools, and was honored by election to the Academy of Sciences in 1783. In 1787 he became a member of the Royal Society of London. He was employed in the latter year together with Mechain and Cassini to measure a degree of latitude between Dunkirk and Boulogne, while General Roy measured on the English side of the Channel, this being done to connect Paris and Greenwich. Subsequently Legendre took a leading part in introducing the decimal system into France. In 1816 he was appointed examiner of candidates for the Polytechnic School. He was not only recognized by his own government as a mathematician of great eminence, but those of other countries regarded him equally efficient and consulted him in regard to various mathematical propositions. He published "Treatise on Ellipses;" "New Methods for the Determination of the Orbits of the Comets;" "Elements of Geometry," and "Theory of Numbers." These works are authoritative, have been translated into many languages, and are still consulted in the higher institutions.

LEGERDEMAIN (lĕj-ẽr-dẽ-mān′), a deceptive performance that depends upon manual skill or dexterity. The different feats of legerdemain are performed by sleight-of-hand, collusion with assistants, mechanical contrivances, or some combination of these easily understood. In giving exhibits of a high character it is common to utilize optical illusions, chemical properties, or some elaborate scientific phenomenon.

LEGHORN (lĕg′hôrn), a seaport on the Mediterranean, situated in the province of Tuscany, Italy, twelve miles southwest of Pisa. It has a safe and commodious harbor, important railroad connections, and modern municipal facilities. The streets are regular and most of the buildings modern. There are manufactures of ships, machinery, clothing, hats, cheese, tobacco, salt, spirituous liquors, cotton and woolen goods, and oil. As a seaport it is one of the most important of Italy, both its import and export trade being extensive. Its general facilities include electric lights, waterworks, and electric railways. The city contains a number of beautiful parks, many statues of noted men, and various public buildings and churches; the most important church is the Madonna. In 1421 Leghorn was a small fishing village and

became a possession of Florence. Its importance dates from the 16th century, at which time its harbor was improved and various manufactures established. In 1835-37 strong fortifications were constructed for its defense. Population, 98,500.

LEGION (lē'jŭn), a division of the army of ancient Rome, constituting at different times a body of men numbering from 2,000 to 6,000. When first organized, the legion comprised fifteen companies, each company containing sixty rank and file, two officers or centurions, and a standard-bearer. Subsequently it was divided into ten cohorts, each cohort into three companies, and each company into two centuries. Romulus established the legion that contained 3,000 foot soldiers. At the time of the Second Punic War the legion numbered from 4,200 to 5,200, and from the year 100 B. C. to the downfall of the empire the number varied from 1,900 to 6,200. An eagle was the standard of the legion.

LEGION OF HONOR, a French order of merit established by Napoleon on May 19, 1802, and maintained for the purpose of recognizing civil and military merit. Originally the decoration was a star bearing the portrait of Napoleon, surrounded by a wreath. On one side was the inscription "Napoleon Empereur des Francais," and on the opposite side it bore the French eagle, holding a thunderbolt in his talons, and the inscription "Honneur et Patrie." The constitution of the order has been remodeled at different times, but at present five ranks are recognized: grand crosses, grand officers, commanders, officers, and chevaliers or knights. By a constituional provision the membership in each rank or class is limited to the following number: grand crosses to seventy; grand officers to 200; commanders to 1,000; officers to 4,000 and chevaliers to 25,000. Membership is limited to those who have served in some military or civil capacity a term of twenty-five years; attained marked eminence in civil arts, or have become noted for skill and bravery in war. The decoration now bears the inscription "Republique Francaise, 1870," while the opposite side has two flags and is inscribed "Honneur et Patrie." The president of France is the grand master of the order by virtue of his office.

LEHIGH, a river of Pennsylvania, rises in Wayne county, and after a course of 120 miles flows into the Delaware River at Easton. The country through which it passes is rich in anthracite coal deposits. In its course the Lehigh passes the cities of Allentown, Mauch Chunk, and White Haven. About seventy miles of its length have been rendered navigable by extensive improvements.

LEHIGH UNIVERSITY. See Bethlehem.

LEIBNITZ (līp'nĭts), **Gottfried Wilhelm,** scholar and philosopher, born in Leipsic, Germany, July 1, 1646; died in Hanover, Nov. 14, 1716. His father was professor of law at Leipsic, where also the younger Leibnitz studied in the Nicholas School. His natural talents were remarkable, and he showed extraordinary ability to acquire and adapt. He became interested in extensive reading at the age of eight years, being fond of the writings of Aristotle and Plato, and at twelve years was versed in Latin classics and began the study of Greek. At the age of fifteen he entered the University of Jena, where he studied for some time, and afterward took a course in law at the university in Altdorf, where he received a doctorate of law in 1666. Though making a specialty of law, he showed profound interest in philosophy and literature, and by utilizing his father's library in research and making experiments he developed many original theories. At the time of securing his degree in law he prepared a thesis which brought an opportunity for him to engage as professor at Altdorf, but instead he chose the post of secretary and tutor in the family of the Baron von Boineburg, with whom he remained till 1672, when he visited Paris. While there he presented a memorial to Louis XIV. in relation to the conquest of Egypt, which, according to general opinion, was the cause of Napoleon's expedition to that country in 1798. Shortly after he was elected a member of the Royal Society in London, formed the acquaintance of Boyle and Newton, and in 1676 was appointed to the office of councilor and librarian of Hanover by the duke of Brunswick. In 1687 he went to Vienna, also visited Italy, and in 1700 became president of the Royal Academy of Sciences at Berlin. Subsequently he was accorded distinguished honors by Peter the Great of Russia. Besides writing extensively on mathematics and philosophy, he gave attention to religious subjects, proposing first to unite the Roman Catholic and Protestant churches, and later the Lutheran and Reformed churches of Prussia. In both of these he failed. Subsequently he engaged in an extended controversy with Newton regarding the differential calculus. His publications embrace "History of the House of Brunswick-Luluberg;" "Monadologie;" "System of Theology," and "General Philosophy." His philosophical system embraces four theories of importance: the theories relating to the pre-established harmony, the doctrine as to the origin of ideas, the theory of monads, and the doctrine of optimism.

LEICESTER (lĕs'ter), a commercial and manufacturing city of England, in Leicestershire, on the Soar River, eighty-five miles northwest of London. It is the focus of several important railroads. The city has many modern municipal facilities, contains much wealth, and is the seat of numerous churches and educational institutions. There are manufactures of ironware, boots and shoes, woolen and cotton goods, thread,

lace, utensils, and earthenware. The surrounding country is fertile and produces considerable quantities of cereals, dairy products, and wool. It is reputed that the city was founded by King Lear. Many valuable relics of remote centuries have been found in its vicinity. The city received its charter from King John. The building of railroads and the growth of manufacturing establishments are the causes of its modern prosperity. Population, 220,250.

LEICESTER, Robert Dudley, Earl of, son of John Dudley, duke of Northumberland, born in 1532; died Sept. 4, 1588. The action taken by his father in contriving a marriage between Guilford Dudley and Lady Jane Grey, and in endeavoring to secure the throne for her, caused his execution, and young Leicester was himself placed under arrest, but afterward liberated by Queen Mary. Queen Elizabeth made him earl of Leicester and elevated him to various offices. He married Amy Robsart, daughter of Sir John Robsart of Devonshire, in 1549, but the union proved unfortunate. His wife settled at the house of Anthony Forster in 1560, where she was murdered. Several circumstances connected him with the deed, but Queen Elizabeth still continued to bestow marked favors upon him, and in 1575 paid him a visit at Kenilworth; the reception and entertainment there forms the basis of Sir Walter Scott's novel known as "Kenilworth." It was popularly believed that the two would form a marriage union, and, when Leicester married the countess of Essex in 1578, Elizabeth was offended. In the expedition of 1585 into the Netherlands Leicester held an important command, but was recalled two years later on account of several marks of incapacity. However, Queen Elizabeth appointed him lieutenant-general in 1588, when England was called upon to make defense against the Spanish Armada. It is thought that his sudden death resulted from poisoning by accidentally taking a potion intended for his wife.

LEIDY (lī'dĭ), **Joseph,** naturalist and author, born in Philadelphia, Penn., Sept. 9, 1823; died April 30, 1891. In 1844 he graduated from the University of Pennsylvania, was retained as professor of anatomy in the same institution, and in 1846 secured a like position in the Franklin Medical College. Subsequently he taught in Swarthmore College, and for a long time in the University of Pennsylvania. He received many distinguished honors by elections to scientific and learned societies, and also the prize of $1,000 from the Boston Society of Natural History. His publications embrace "Extinct Sloth Tribe of North America;" "Extinct Species of the American Ox;" "Ancient Fauna of Nebraska;" "Tapeworm in Birds;" "Cretaceous Reptiles;" "On the Fossil Horse," and "Elementary Text-Book of Human Anatomy."

LEIF ERICSSON, celebrated Norse discoverer, born in Iceland about 970; died about 1020. He was a son of Erik the Red. King Olyf Trygvason sent him on an expedition to introduce Christianity into Greenland, and later he landed on the northeastern coast of North America, in 1001. It is thought he cruised along the coast of Newfoundland and Nova Scotia, and that he sailed southward to New England, which he named Vinland.

LEIGHTON (lā'tŏn), **Frederick, Baron,** artist, born in Scarborough, England, Dec. 3, 1830; died in London, Jan. 25, 1896. He studied chiefly in Rome, later in Berlin and Florence, but previously acquired a general education at Frankfort-on-the-Main, Germany. His ability as a painter developed from natural aptitude as well as studious application, and as early as 1849 he produced at Brussels several excellent specimens of art. In 1855 he exhibited his "Cimabue's Madonna" at the English Royal Academy, which attracted such general attention that Queen Victoria purchased it. Later, in 1878, he became president of the Royal Academy, was knighted, and in 1886 was made a baronet. His principal paintings include "Star of Bethlehem;" "Orpheus and Eurydice;" "Girl Feeding Peacocks;" "Hercules Wrestling with Death," and "Triumph of Music." He also produced several valuable sculptures, among them his "Sluggard" and his "Athlete Strangling a Python."

LEIGHTON, Robert, prelate, son of Alexander Leighton, born in Edinburgh, Scotland, in 1611; died June 26, 1684. His father was persecuted by Laud for opposing the spread of the Episcopal faith in Scotland, but this did not deter Robert from becoming a devoted adherent and advocate of the Presbyterian Church. He studied at the University of Edinburgh, and in 1641 was ordained a minister of the Presbyterian Church at Newbattle. Ten years later he became principal of the Edinburgh University, remaining nine years, when he accepted the offer of a Scotch bishopric at Dunblane made by Charles II. In this capacity he labored unsuccessfully to conciliate the two religious faiths, and in 1674 resigned and retired to London, England, where he died.

LEIPSIC (līp'sĭk), an important commercial city of Germany, situated in a fertile region of Saxony, and connected by a large number of important railroads. It contains beautifully paved streets, extensive parks, modern municipal facilities, and many historic buildings and churches. The old portion of the city has narrow streets, while those of the newer part are entirely modern. The town hall dates from 1556, and besides it are a number of buildings of the Renaissance style. It contains an extensive museum, several theaters, a castle, and several monuments. Among the monuments is a fine work of art dedicated to scenes in several wars, erected in 1888. The manufactures embrace machinery, cotton and woolen

goods, musical instruments, spirituous liquors, ribbon, earthenware, leather, paper, clothing, and ships. Its commercial trade is extensive. There are electric street railways, waterworks, parks, and sewerage. Numerous scientific and religious societies are supported and about 500 publishing houses are maintained, many of which have printing establishments connected.

Educationally Leipsic is one of the most important cities of the world, containing a fine public school system, several gymnasia, conservatories of music, business colleges, industrial schools, and the celebrated University of Leipsic. This great educational center was founded in 1408, represents property of much value, and is efficiently equipped with courses of study and apparatus. There are 200 professors, 3,500 students, and a library of 400,000 volumes. The city of Leipsic dates from the 11th century, when it was founded by the Wendish. It has been the seat of many historic conventions and battles. In the Reformation it suffered intensely, was besieged and taken five different times, and near it, at Breitenfield, occurred the victory over Tilly by Gustavus Adolphus on Sept. 17, 1631. The so-called "Battle of Nations" occurred there on Oct. 16-19, 1813, between the allied forces of Prussia, Austria, Sweden, and Russia, and Napoleon, in which the French were defeated and a step toward Napoleon's final overthrow was accomplished. In this battle Napoleon had an army of 180,000 men, while the allied forces numbered about 300,000. The annual jobbing trade of Leipsic is at present estimated at $60,000,000. Population, 460,115.

LEITH (lēth), a seaport of Scotland, on the Firth of Forth, a short distance north of Edinburgh. It has an important harbor, is connected by several railroads with other commercial centers, and engages extensively in the manufacture of sugar, engines, machinery, spirituous liquors, fabrics, cordage, and ships. In 1128 it was known as Inverleith. Robert I. granted the city, port, and mills of Leith to Edinburgh in 1329. As an export and import city Leith is of growing importance, its trade in coal being particularly extensive. Population, 70,280.

LEITNER (līt'nẹr), **Gottlieb Wilhelm**, author and traveler, born of German parents in Budapest, Hungary, Oct. 17, 1830; died in Bonn, Germany, March 24, 1899. His father was a German physician, and, being involved in the revolution of 1839, went to Turkey, where Gottlieb acquired proficiency in modern Greek Arabic, and Turkish. Subsequently he studied the French, Italian, and English at Malta, and afterward took a course at King's College in London, where he was chosen teacher of Arabic in 1859. He became director of the college at Lahore in the Punjab in 1864, and while there established scientific societies, libraries, schools, and periodicals, and explored Thibet, Kashmir, Ladakh, and Dardistan. His explorations resulted in valuable additions to knowledge of Sanskrit and other ancient subjects of interest. He published "Philosophical Grammar of Arabic;" "Races of Turkey;" "Comparative Grammar of Dardu;" "History, Songs, and Legends of Dardistan;" "Education in the Punjab," and "Theory and Practice of Education."

LELAND (lee'land), **Charles Godfrey**, author, born in Philadelphia, Penn., Aug. 15, 1824. He graduated from Princeton College in 1847, and resided in Europe two years, studying at Heidelberg, Munich, and Paris. Subsequently he became acquainted with the language of the Gypsies by living with them in various countries. He returned to America in 1848, was admitted to the bar, but devoted his time to literary research and study. In 1869 he again went to Europe, where he remained eleven years, and on his return to America devoted his attention to introducing manual teaching in the public schools of Philadelphia. His publications include "Hans Breitmann's Ballads;" "Legends of Birds;" "English Gypsies and Their Language;" "Meister Karl's Sketch-Book;" "Poetry and Mystery of Dreams," and "Algonquin Legends." He died March 20, 1903.

LELAND STANFORD, JUNIOR, UNIVERSITY, an educational institution at Palo Alto, California, founded by Leland Stanford and Jane Lathrop Stanford in memory of their only son. The institution was opened in 1891 with David Starr Jordan as president. It is co-educational, carries diversified and carefully articulated courses of study, has 130 instructors, and a library of 60,500 volumes. The gifts by Stanford amounted to about $9,000,000, and those of Mrs. Stanford include the entire estate, which, by the terms of her will, is to become property of the university. The entire endowment, including those made by both, aggregates $20,000,000. A board of twenty-four trustees, chosen for life, has general management. There is an attendance of 1,500 students at the university.

LELY (lee'lỹ), **Sir Peter**, eminent painter, born in Westphalia, Germany, in 1617; died in London, England, in 1680. He studied painting at Haarlem under Peter Grebber, commenced painting landscapes and portraits, and in 1641 settled at London. Charles I. and Cromwell engaged him to paint portraits, while Charles II. made him court painter and knighted him. Lely possessed remarkable facility of execution, was a careful student of outlines, and became the most distinguished portrait painter of his time in England. At Hampton Court is a collection, known as beauties of the court of Charles II., in which many of his finest productions are preserved.

LEMAN, Lake, a name frequently applied to Geneva Lake. See **Geneva, Lake of.**

LE MANS (lẹ-mŏn'), a town on the Sarthe

River, in France, about 132 miles southwest of Paris. It is the government seat of the department of Sarthe, has excellent railroad connections, paved streets, electric street railways, public parks, and numerous churches. The most noteworthy public building is the St. Julian Cathedral. There is an important trade in farm produce and poultry. The manufactures include cotton and woolen goods, lace, candles, soap, and machinery. In 1871 it was the scene of a decisive battle, in which an army of 100,000 French was defeated by the Germans under Prince Frederick Charles. Population, 58,945.

LE MARS (lę märz'), county seat of Plymouth county, Iowa, twenty-five miles northeast of Sioux City, situated on the Floyd River. It is connected extensively by railroads, has excellent educational advantages and good municipal facilities. There are manufactures of flour and machinery, and a large trade in cereals and live-stock. It is the seat of the Le Mars Normal School, now under the direction of the German Reformed Church. Population, 1900, 4,146.

LEMBERG (lĕm'bĕrg), an important railroad and commercial city of Austria, the government seat of Galicia, situated in a fertile region. The city was founded in 1259. It was important as a strategic point while belonging to Poland, but passed into possession of Austria in 1772. Its general prosperity dates from the early part of the last century. It has manufactures of machinery, matches, spirituous liquors, cotton and woolen goods, and farming utensils. There is an important trade in farm produce, mechandise, live-stock, and fruits. The streets are beautifully paved, lighted by gas and electricity, connected by electric street car lines, and improved by a number of beautiful parks. It has fifteen monasteries, many churches, and is the seat of Greek Catholic, Armenian, and Roman Catholic archbishoprics. The university was founded in 1784. It has eighty-five professors, 1,575 students, and a library of 100,000 volumes. The inhabitants consist principally of Germans and Poles, for each of which separate gymnasia are maintained. Population, 158,875.

LEMMING (lĕm'mĭng), a rodent quadruped found in the northern parts of America and Eurasia, particularly in Norway and Sweden. There are several species. They are allied to the rat and mouse, mostly brownish-black in color, body heavy-set, limbs short, and head large. The common lemming is about six inches long, and the tail only half an inch. The different species feed on grass, reindeer moss, vegetables, and lichens. Their favorite habitations are in burrows a short distance below the surface, in which they bring forth several litters of young per year, numbering from three to five at a birth. The lemming is noted for migrating at certain periods, especially at the approach of winter, when they form an immense line and proceed in parallel columns. In their course they are preyed upon by flesh-eating animals, such as wolves, foxes, and bears, but they move

LEMMING.

across streams and mountains and even venture far into large bodies of water, where many lose their lives. The Hudson Bay lemming is the best known American species. It is found as far south as the northern part of the United States.

LEMNOS, an island in the Ægean Sea, the most northerly of the Grecian Archipelago, situated midway between Mount Athos and the Hellespont. There are several large bays, the extinct volcano Mosychlus, and a generally productive soil. The productions include cereals, wines, tobacco, and fruits. Greeks constitute the principal portion of the population, which numbers about 27,500, and the area is 165 square miles. In 1657 the island passed from the Venetians to the Turks, since which time it has been a Turkish possession. Lemnian earth was first found in Lemnos, but occurs also in Russia, Bohemia, India, and other countries of Eurasia. It is caused by a decay of feldspathic rocks, has a fatty consistency, is reddish in color, and is used as a medicine in cases of dysentery and other diseases. Lemno, or Kastro, is the chief town.

LEMON, the fruit of the tropical or subtropical tree citrus medica, of the orange family, and originally native to the tropical portions of Asia. It is quite certain that lemons were unknown to the ancient Greeks and Romans, and that this fruit was introduced into Spain by the Arabs about the 12th century. The lemon tree has since been naturalized extensively; many varieties have been produced by cultivation, and the fruit forms an important article of commerce. The fruit is ellipsoidal with a protruding point at each end, from two to four inches in length, bright-yellow in color, the skin quite thick, and the internal pulp very acid and juicy. There are from eight to twelve compartments in the fruit, each containing several seeds. On account of their keeping property lemons are more profitable to grow than oranges. The tree is knotty-wooded, has oval leaves, and grows to a height of about eight feet. It bears very abundantly, many trees producing 3,000 lemons in a favorable season.

The fruit of the lemon tree is gathered while still green, wrapped in small papers, and shipped in boxes for consumption in the general market, the ripening taking place in transit or while kept in the store. Among the favorite varieties of lemons are the sweet

LEMON.

lemon, thin-skinned lemon, common lemon, and citron lemon. The principal uses are for the manufacture of oil of lemon, a volatile oil secured from the fresh rind; for flavoring in cookery; to make lemonade and other drinks; as a stimulant in medicine, and for perfumery. Oil of lemon is secured from the rind by pressure. Lemon extract is made largely from the more imperfect fruit by squeezing, and, after removing all foreign properties, it is prepared with deodorized spirits and filtered. The most extensive production of lemons in the United States is in California and Florida, where large fields are cultivated successfully, and immense quantities transported to all parts of America. The principal production of lemons in Eurasia is on the islands and countries of the Mediterranean. However, the Greek island of Andros and Sicily are particularly important in the culture of the lemon tree. In 1790 lemon culture was introduced into Australia, where it is proving profitable.

LEMUR (lē′mŭr), a class of mammals allied to the monkey, and found mainly in Madagascar, but related species are common in Africa, southern Asia, and the Philippines. The body is long, skull small and flat, snout long, hind limbs longer than the fore limbs, and the tail furry. They inhabit forest districts, move about principally by night, and may be domesticated, when they become docile and playful. The food consists of insects, vegetables, reptiles, birds, and fruits. Most of the species resemble the monkey in many respects, while others have fox-like faces and are about the size of a cat.

LENA, one of the largest rivers in the world, rises near Lake Baikal in southern Siberia, has a northeast course to Yakutsk, and thence flows nearly north into the Arctic Ocean. Its entire length is 2,775 miles, its basin 950,000 square miles, and the delta 250 miles wide. From May to October it is navigated, forming the most important transportation route of eastern Siberia, but the remainder of the year it is frozen. The valley is highly fertile, especially its upper part, where stock raising and farming are extensive industries.

LENORMANT (lẹh-nor-mŏn′), **Charles**, art critic and archæologist, born in Paris, France, June 1, 1802; died in Athens, Greece, Nov. 24, 1859. He studied law, but after traveling in Italy decided to devote his life to archæological research. He accompanied Jean Francois Champollion (1791-1832) to Egypt in 1828, where he assisted in exploring several ancient ruins, and, after returning to France, was made professor of Egyptian archæology at the College of France. He wrote "Introduction to Oriental History." His son, Francois Lenormant (born in Paris, Jan. 17, 1837; died there Dec. 10, 1883), likewise attained to fame as an archæologist. After studying under his father, he traveled in Eurasia and Africa, attended the conference of Orientalists at Florence in 1878, and published numerous works on ceramics, archæology, and antiquity.

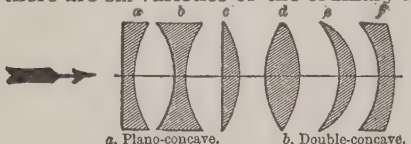
LENOX (lĕn′ǫks), **James**, philanthropist, born in New York City, Aug. 19, 1800; died Feb. 18, 1888. After graduating at Columbia College, he studied law, and at the death of his father inherited a vast fortune. He devoted nearly a half-century to the collection of books, which in 1870 were valued at $1,000,000, and these he donated to found the Lenox library in New York City. He also gave land and $500,000 for the erection of the Presbyterian hospital. His cash gift to the Lenox library was $450,000.

LENS, a piece of transparent substance, usually glass, so called from the resemblance in form to the seed of a lentil, which

LEMUR.

is like a double-convex lens. A lens is shaped so as to afford two regular opposite surfaces, both curved, or one plane and the other curved, and designed to change the direction of rays of light, and for increasing

or diminishing the apparent size of objects viewed through it. A lens that hollows or rounds inward is said to be concave; and one that rounds outward, convex. The curved surfaces are usually spherical, and there are six varieties of the ordinary lenses



a, Plano-concave. *b*, Double-concave.
c, Plano-convex. *d*, Double-convex.
e, Meniscus. *f*, Concavo-convex.

of this description. Different forms of lenses are used in the manufacture of telescopes, opera glasses, stereoscopes, spectacles, microscopes, lanterns, and other instruments and devices. The best grade of crown or flint glass is used in making lenses for microscopes and telescopes, and, since great accuracy is necessary in grinding and polishing, the lenses for the larger instruments represent much value. The six varieties of curved lenses include the double-convex lens; plano-convex; double-concave; meniscus; plano-concave, and concavo-convex. The meniscus are lenses in which the convexity is greater than the concavity; and the concavo-convex have greater concavity than convexity.

LENT, a fast of forty days, observed annually from Ash Wednesday till Easter by the Anglican, Roman Catholic, and other churches as a season of special penitence and self-denial. It was instituted by the early Christian Church in commemoration of the resurrection of Christ, and to commemorate his fast of forty days in the wilderness. Originally the fast was but thirty-six days, the four additional being added in the 5th century, which change was generally accepted. Much rejoicing accompanies the close of Lent in Roman Catholic countries, and its beginning is preceded by the carnival. In many churches the fasting is left to the individual conscience of each members, but all are admonished to prayer.

LENTIL (lĕn'tĭl), a plant cultivated extensively in Eurasia for fodder and for human food. It grows to a height of about twenty inches, has numerous branches, whitish flowers, and bears seeds about as large as a pea. Garden lentil and field lentil are the two varieties commonly cultivated in Germany, France, Syria, and Egypt. Lentil straw is a wholesome fodder for stock, and the seeds are used in cookery for soup, and are also fried and prepared much like beans and peas.

LEO, the name of thirteen popes, four of whom are treated in biographies, and the others reigned as follows: Leo II., from August, 682, to July, 684; Leo IV., from 847 to 855; Leo V. succeeded Benedict IV. in 903, and reigned thirty days; Leo VI. succeeded John X. in 928, and reigned about seven months; Leo VII., from 936 to 939; Leo VIII., from 964 to 965; Leo IX., from 1049 to 1055; Leo XI. succeeded Clement VIII., on April 1, 1605, and died on the 27th of the same month; Leo XII., from 1825 to 1829. See **Pope**.

LEO I., surnamed The Great, pope of Rome, born in Rome, near the end of the 4th century; died there in the year 461. He descended from a distinguished family, received a liberal education, and in 440 succeeded Sixtus III. as pope. In the early part of his reign the Huns threatened to overrun Italy, and, after Atilla captured Aquileia, he led his hosts against Rome, but Leo met him at the Po River and persuaded him to spare the city. In 455 the Vandal chief Genseric made an attack upon Rome, but would not be persuaded by Leo to spare the city, though at his request he restrained from murder and exempted the oldest basilicas from plunder. Leo was distinguished for remarkable zeal in pontifical duties, and his letters are strong evidences of his devotion and ability.

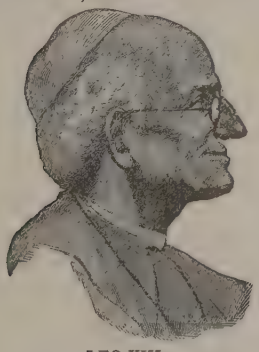
LEO III., pope of Rome, born in 750; died June 11, 816. He was a native of Rome, and was elected to succeed Adrian I. on Dec. 26, 795. During his reign occurred the establishment of the Western Empire. His pontificate was disturbed by several conspiracies, the first occurring in 799, when he retired to Spoleto, but soon after met Charlemagne in conference at Paderborn. Subsequently he was received at Rome with much honor, and in 800 he crowned Charlemagne as emperor of Rome. The latter granted him temporal sovereignty over the city of Rome and the state, and in 804 Leo visited the court of Charlemagne at Aix-la-Chapelle. In 815 a conspiracy was formed against Leo, on account of which a number of participants were executed. This led to a dispute with the successor of Charlemagne, Louis le Debonnaire, and the sovereign jurisdiction of Leo in Rome was called into question. The controversy was not concluded until after his death.

LEO X., Giovanni de Medici, pope of Rome, born in Florence, Italy, Dec. 11, 1475; died Dec. 1, 1521. He was the second son of Lorenzo de Medici, who designed him for an ecclesiastical career, and secured the ablest scholars obtainable as his teachers. Innocent VIII. made him a cardinal when only thirteen years of age, and, when the Medici family was expelled from Florence, he sought the acquaintance of learned society by traveling in Germany, France, and the Netherlands. In 1503 he returned to Rome. Julius II. appointed him legate in 1511, a position by which he secured nominal direction of the Spanish and papal army besieging Bologna. On April 11, 1512, the French and Italian troops were successful in the battle of Ravenna, and he was taken prisoner. When the conquering army evacuated Milan, he effected his escape. On March 11, 1513, he succeeded Julius II. as

Leo X. Soon after his election the king of France made an effort to conquer Milan, but Leo repelled the invasion and began to solidify and strengthen his dominion.

Pope Leo began early in his pontificate to favor learning, for which purpose he called to his assistance the most eminent scholars of his time, among them Bembo and Sadoleto, who became his secretaries. He established a Greek college at Rome, endowed a Greek press, and encouraged sculpture, painting, architecture, and internal improvements. Desiring to rebuild St. Peter's, he permitted the issuance of indulgences to contributors, a course which led to the Protestant Reformation in Germany under the leadership of Martin Luther. Leo treated the Reformation as a controversy between Luther and Tetzel, but condemned Luther's doctrines and sought at first to counteract them by moderate means, and afterward by more severe procedure, but the rising was too powerful and the papal loss in Germany became irreparable. Leo ranks in history as a man of excellent private conduct and moral aptitude, and died amid political prosperity, but with the Reformation in a state of vigorous development.

LEO XIII., pope of Rome, son of Count Ludovico Pecci, born in Carpineto, Italy, March 2, 1810. In 1818 he entered the Jesuit college at Viterbo, later studied at the Collegio Romanio, and taught philosophy in German College. His ability as a student and speaker was recognized at an early age, being able to write Latin with facility at the age of twelve, and showing like aptitude in other branches of study. His education was completed at the College of Noble Ecclesiastics and the Roman University, and in 1837 Gregory XVI. conferred the priesthood upon him. Subsequently he filled a number of important positions in the church, was created a cardinal by Pius IX. in 1853, and in 1877 was appointed to fill the important office of cardinal camerlengo of the Roman Catholic Church, succeeding Cardinal de Angelis. In that position he was head of the church in temporal matters, made arrangements for the last solemn obsequies of Pius IX., and received the Catholic ambassadors for the conclave. On Feb. 20, 1878, he was chosen successor of Pius IX., assuming the name of Leo XIII.



LEO XIII.

The policy of Pope Leo from the first was to act with modern means in government, but he maintained the right of restoration to the temporal power and sovereignty. Among his most noted achievements may be enumerated the arbitration in relation to the kulturkampf in Germany, the establishment of terms with the clergy in France, and the restoration of the hierarchy in Scotland. In a dispute between Germany and Spain in relation to the Caroline Islands he acted as arbitrator, and also took a prominent part in suppressing the slave traffic in Africa. As affecting the laboring classes he promulgated several letters in opposition to socialism, indicating that the labor question may be settled by the application of Christ's religion under the influence and authority of the papacy. He maintained views regarding education in opposition to secularization, taking positions in this line on the Manitoba school questions and controversies arising elsewhere. He also gave support to the ancient doctrine that the pope stands as the vicegerent of Christ, and in an open letter to W. E. Gladstone confirmed the explicit view of his predecessors that all ordinations under Anglican rites are invalid. As a scholar he had a high standing, encouraged learning, and also wrote a number of poems. He died July 20, 1903.

LEOCHARES (lē-ŏ-kā′reez), a celebrated sculptor of ancient Greece, who flourished in the 4th century B. C., and was classed as a member of the younger Attic school. Among his productions are a statue of Isocrates, and his "Abduction of Ganymede by the Bird of Jove," besides other portrait statues. Philip of Macedon engaged him to execute memorials of his victory at Chæronea.

LEOMINSTER (lĕm′ĭn-stẹr), a city of Worcester county, Massachusetts, on the Nashua River and several railroads. The surrounding country is agricultural and dairying. It is supplied with electric street railways, public lighting, city waterworks, and a library of 15,000 volumes. The manufactures embrace musical instruments, linen and woolen goods, buttons, clothing, toys, and utensils. There are numerous fine public schools and many beautiful edifices. Population, 1900, 12,392.

LEON (lē′ŏn), a city in the state of Guanajuato, Mexico, situated in a fertile plain, and connected by railways with the capital city. It is noted for its manufacture of machinery, cotton and woolen goods, and leather, and an extensive jobbing trade. There are several fine churches, schools, and government buildings. The city has modern municipal facilities, including waterworks, sewerage, and a public park. It has a number of well improved streets. Population, 49,125.

LEON (lā-ōn′), the principal city of Nicaragua, Central America, capital of the department of Leon, situated on the east side of Lake Leon. It is surrounded by fertile plains, has good railroad connections, and excellent public buildings. The city is the seat of an episcopal palace, several churches,

and the College of St. Ramon. It has a good public school system, modern municipal facilities, and contains a massive cathedral. The manufactures and commercial enterprises are important. There is a growing trade in live-stock, cereals, fruits, and merchandise. Population, 61,385.

LEON, a city of Spain, capital of the province of Leon. It is celebrated as the capital of an ancient kingdom of the same name. The city was founded by the Romans, who named it Legio. Population, 13,318. See **Spain**.

LEONARDO DA PISA, or **Leonardo Bonaccio**, mathematician, born in Pisa, Italy, in 1170. He studied under a master who taught the Arabic system of arithmetic, and traveled in Syria and Egypt, which enabled him to extend the knowledge of mathematics in Europe. Some writers think he was the first to introduce algebra into Europe. It is not known when he died.

LEONHARD (lā'ōn-härt), **Karl Cäsar von**, eminent geologist, born near Hanau, Germany, Sept. 12, 1779; died in Heidelberg, Jan. 23, 1862. He studied at Marburg and Göttingen, after which he devoted several years to work on scientific journals, and held important offices in the principality of Hanau. In 1814 he retired from public office to apply his entire time to scientific research, and in 1816 became a member of the Bavarian academy of sciences. Two years later he was made professor of geology and mineralogy at Heidelberg. The most important of his numerous works is "Basis of Mineralogy." From 1830 to 1858 he published "Year-Book of Mineralogy, Geognosy, Geology, and Petrification."

LEONIDAS (le-on'ĭ-dąs), king of Sparta, born in the latter part of the 5th century B. C. He was the son of Anaxandrides, succeeded his half-brother, Clomenes I., as king of Sparta, and distinguished himself in defending the pass of Thermopylæ against Xerxes. The Greek congress placed the command of the forces designed to defend the pass upon Leonidas. With a force of 5,000 men, aided by about 300 Spartans, he made a heroic defense with apparent success, but the Persians were informed of a mountain pass, through the treachery of Ephialtes, and in attempting to resist the combined attack from front and rear Leonidas and the band of 300 Spartans fell after making a remarkable resistance. The conduct of this noble band was an inspiration to the Grecians, and has been celebrated in song and story by the master writers of the world.

LEOPARD (lĕp'ĕrd), a ferocious, carnivorous mammal native to southern Asia and Africa. It is regarded by some writers as allied to the panther, by some as a species of it, and by still others as a distinct species. The color is largely a pale-fawn spotted over with dark brown or black in rosettes or broken rings. The lower part of the body is whitish, tail long, and the movements, graceful and rapid. It can leap over precipices with ease, and delights to ascend trees, from which it springs upon its prey with marked certainty. The leopard is

LEOPARD.

bloodthirsty, often killing more than it can devour for the sake of the fresh blood, and steals from ambush upon its prey, such as poultry, deer, antelope, or any animals it can overcome. Its size and strength is sufficient to overcome a man, but it rarely attacks human beings, except in defense or when in dire need of food.

LEOPARDI (lā-o-par'dee), **Giacomo**, scholar and poet, born at Recanati, Italy, June 29, 1798; died in Naples, June 14, 1837. He descended from a noble family, was able to speak Latin and Greek at the age of sixteen, and also developed a proficiency in French, Spanish, Hebrew, German, and English. In 1822 he visited Rome, and shortly after was offered the chair of Greek philosophy at the University of Berlin, but declined to engage in literary research. He was of a despondent mind, but showed a genius equal in many respects to Dante. His writings consist principally of dialogues in prose and a number of volumes of poetry, all of which are characterized by elegance of style, depth of thought, and marked originality. "Il sabato del villagio" is considered his best poem.

LEOPOLD, the name of two German, or Holy Roman, emperors. Leopold I. was born June 9, 1640; became king of Bohemia and emperor of Rome in 1658; and died May 5, 1705. Leopold II., son of Francis I., was born May 5, 1747; became emperor in 1790; died March 1, 1792, and was succeeded by his son, Francis II.

LEOPOLD I. (lee'o-pōld), king of Belgium, born in Coburg, Germany, Dec. 16, 1790; died Dec. 10, 1865. He was the son of Francis, duke of Saxe-Coburg-Saalfeld, received a liberal education, and entered the Russian army, in which he became a general and took part at the battles of Lützen, Bautzen, Leipsic, and Köln. After the peace of 1815, he visited England, where he married Princess Charlotte, heiress of the throne, in 1816, and received an annual pension of $250,000. Princess Charlotte died in 1817, after which he resided in London, and in 1830 declined the crown of Greece. A national congress elected him king of the

Belgians in 1831, and on July 21 of that year he was inaugurated at Brussels. The following year he married Princess Louise, daughter of the French king, Louis Philippe. His wife died in 1850, but bore three children, including the Crown Prince Leopold, another son, and a daughter. His administration was highly acceptable to the people of Belgium, being moderate, mindful of industrial and educational advancement, and showing a strict regard for the principles of the national constitution.

LEOPOLD II., king of Belgium, son of Leopold I., born in Brussels, April 9, 1835. He was liberally educated in the leading institutions of Belgium and Germany. His title as crown prince was duke of Brabant, and he served as a member of the national senate, in which he became distinguished as an influential advocate of internal and maritime improvement. On Aug. 22, 1853, he married Archduchess Maria of Austria, and at the death of his father, on Dec. 10, 1865, was crowned as Leopold II. In policy his administration was mindful of the constitution and the vigorous reign of his father. He took an active interest in promoting the exploration of Africa, and was practically the organizer of the Congo Free State, which region was placed under his sovereignty in 1890 by an international conference. In the administration of the government he was highly successful, and enjoyed the confidence and respect of his constituents.

LEOPOLD II.

LEOPOLDVILLE, an important city of the Congo Free State, situated on the Congo River, at the outlet of Stanley Pool. It is connected by a number of important railroads, giving it decided trade advantages. The cataracts occupy a distance of 235 miles, and are impassable by vessels, but about 7,000 miles of the Congo River and its tributaries above Leopoldville are navigable, hence the importance of the city as a trade and commercial center. The streets are platted at right angles. There are electric lights, waterworks, and several fine schools and churches. The city was named from Leopold, king of Belgium. Population, 27,875.

LEPANTO (lę-păn'tō), a seaport of Greece, on the north coast of the Gulf of Corinth, or Lepanto, and anciently of vast commercial importance. It came into possession of the Athenians after the Persian wars. The Venetians fortified it in 1477, and also improved its harbor. On Oct. 7, 1571, a memorable battle occurred near Lepanto between the fleet of the Turkish sultan and the allied fleets of Philip II. of Spain, Pope Pius V., and the Venetian republic. Prince Don John of Austria commanded the allied fleets, while the Ottoman fleet was under command of Ulutch Ali of Algeria, Ali Pasha, and Mohammed Sirocco of Egypt. The battle raged four hours, and terminated in the destruction of the Ottoman fleet of 200 galleys and sixty other vessels. From the battle of Lepanto dates the decline of Turkish power in Europe.

LEPIDUS, M. Æmilius, member of the second Roman triumvirate, and first prominent in statesmanship as consul in 46 B. C. He was a man of much wealth and influence, was appointed by Cæsar to the government of Narbonensis in Gaul, in 44 B. C., but Cæsar's death occurred before he left Rome, and accordingly he sided with Mark Antony. In 43 B. C. he joined Octavianus and Antony in the triumvirate, and received as his share of the empire Narbonensis and Spain. The following year he received Africa, where he ruled until 36 B. C., and, after endeavoring to seize Sicily, he was deposed from the triumvirate by Augustus and banished to Circeii, where he died in the year 13 B. C.

LEPROSY (lĕp'rō-sy), a chronic skin disease characterized by ulcerous eruptions and successive scaling off of dead skin. Those affected show symptoms that include thickening of the skin, loss of hair and feeling, offensive perspiration, ulceration, and death of parts. There are two forms, known as tuberculous and non-tuberculous, or anæsthetic. In ancient times various forms of skin diseases were regarded as leprosy, but it is now generally restricted to elephantiasis, the name applied by the Greeks, and designated lepra by the Arabs. Leprosy is hereditary. It is regarded contagious, being caused by a minute organism, a bacillus, which may be conveyed to those not affected, and after a time develops the worst forms known. In former times the disease was prevalent to a vast extent, but was found more frequently in men than women, and prevailed principally among the people excessively exposed to filth, poverty, and cold damps. At present it prevails most extensively in Iceland, the Pacific islands, the Hawaiian Islands, the West Indies, Madagascar, Greek archipelago, in the vicinity of the Mediterranean, and the East Indies.

There has been an increased effort within recent years to not only limit the spread of leprosy, but to provide adequate care for those afflicted. In Louisiana is a plantation for lepers, on which several hundred receive treatment, while similar provisions have been made in a number of the other states. One of the largest colonies of lepers now within the domain of the United States is on the island of Molokai, one of the Hawaiian group, where about 1,200 persons are confined, about one-third of whom are females. A semi-official esti-

mate published in 1901 placed the number of lepers in the Philippine Islands at 30,000, most of whom are in the Visagas. There are 200,000 registered lepers in Japan, and an estimate places the number in India and China at 500,000 in each country.

LEPSIUS (lĕp'se-o͝os), **Karl Richard**, noted Egyptologist, born in Narmburg, Germany, Dec. 23, 1810; died July 10, 1884. He studied at Leipsic, Göttingen, and Berlin, and secured a doctor's degree in 1833. The following year he was awarded a prize at Paris on account of an essay. Soon after he published his "Means of Studying Philology." In 1835 he began historical research of Egyptian antiquaries, for which purpose he visited Rome, where he met Bunsen, and in 1842-45 was delegated by the king of Prussia to make explorations in Lower and Upper Egypt. His party assembled in Alexandria in 1842, whence he directed an extensive research of various ruins, monuments, and tombs. After his return to Berlin, he became professor in the University, but in 1866 visited Egypt a second time to explore the Nile delta. He became librarian of the Prussian state library at Berlin in 1874. His publications include "Universal Standard Alphabet;" "Chronology of the Egyptians;" "Monuments of Egypt and Ethiopia;" "Cosmos," and "Death Book of the Egyptians."

LERMONTOFF (lĕr'mon-tof), **Mikhail Yurevitch**, scholar and poet, born in Moscow, Russia, Oct. 15, 1814; died July 15, 1841. He was educated at Moscow and St. Petersburg, became an official in the imperial guard in Russia, and in 1837 was sent as an officer of dragoons to the Caucasus. His death resulted from a duel in which he was mortally wounded by a fellow-officer. The writings of Lermontoff are among the most celebrated of Russian products. His best known works include "Song of the Czar Ivan Vasilievitch;" "A Hero of our Times;" "The Demon," and "The Dream of Valerika."

LE SAGE (leh säzh), **Alain Rene**, dramatic writer and novelist, born in Sarzeau, France, May 8, 1668; died in Boulogne, Nov. 17, 1747. He was educated at the college of the Jesuits at Vannes, entered upon the study of law at Paris in 1692, and soon after was admitted as an advocate. He married a Parisian lady in 1695 and soon after began to devote his entire time to literary research. In his work he secured the assistance of Abbe de Lyonne, who granted him a pension and the free use of a large Spanish library, by which was facilitated the study of Spanish. His first work of importance was the translation of the "Adventures of Don Quixote," after which he produced many original dramas and novels, some of them being among the finest gems in the French language. His "Gil Blas de Santillane" is regarded his masterpiece, the fourth volume of which appeared in 1735. This work has been translated into many modern languages, and is distinguished for its characteristic delineation of character, accurate language, and superb style. His writings include "Adventures of Robert;" "Asmodeus," and "Orlando Innamorato."

LESBOS, an island formerly belonging to Greece, but now a part of Turkey and known as Mitylene. It is situated in the Ægean Sea, near the coast of Asia Minor, has a triangular form, and an area of 276 square miles. The surface is generally mountainous, but there are large tracts of fertile coast and valley lands. Among the chief products are pine timber, live-stock, cereals, and tropical fruits. Æolian colonists settled the island at an early period and built cities upon it. The poets and literary men of Lesbos included Sappho, Theophrastus, Arion, Pittacus, and several others famous in the history of Greece. Since 1462 it has been a possession of Turkey. It has a population of 40,000, of which about 16,000 are Turks and the balance Greeks.

LESINA (lĕs'ē-nä), an island in the Adriatic Sea, situated near Dalmatia, and belonging to Austria. Its principal town is Lesina, which has a good harbor, and exports fruits and cereal products. Population of the island, 15,380.

LESLIE (lĕs'lĭ), **Charles Robert**, noted painter, born in London, England, Oct. 19, 1794; died there May 5, 1859. He was born of American parents and settled with them at Philadelphia in 1799, where he was educated and engaged as book-seller. Later he pursued private study in art, but in 1811 went to London, where he entered the Royal Academy, and subsequently formed the friendship of Coleridge, Washington Irving, West, and Allston. After completing his studies and engaging largely in the painting of portraits and historic scenery, he returned to America, and in 1833 became teacher of drawing at the West Point Military Academy. This position he resigned the following year and returned to England, where he continued to reside until his death. His best known productions include "Saul and the Witch of Endor;" "May-day in the Time of Queen Elizabeth;" "Sancho Panza and the Duchess," and scenes from the writings of Addison, Le Sage, Swift, Shakespeare, Cervantes, Fielding, Moliere, Sterne, and Smollett. His works are noted for their genial humor and excellence in composition.

LESSEPS (lă-sĕp'), **Ferdinand de, Vicount**, diplomatist and engineer, born in Versailles, France, Nov. 19, 1805; died Dec. 7, 1894. After securing a liberal education, he was appointed for diplomatic service at Lisbon in 1839, and subsequently held similar positions at Barcelona, Tunis, and Alexandria. He was detained in quarantine at Port Said in 1841, and while there conceived the utility of the Suez Canal, which he began to agitate in 1856 by publishing outlines of the proposed course across the Isthmus of Suez. The viceroy of Egypt granted a charter, but the project was delayed

by hostility of various nations, particularly England, but De Lesseps succeeded in securing the necessary encouragement and capital, and the canal was formally opened to traffic on Nov. 17, 1869, the exercises being witnessed by the emperor of Austria, the crown prince of Prussia, and the empress of France, besides many other distinguished individuals.

In 1873 De Lesseps began the agitation in favor of a canal across the Isthmus of Panama, and in 1876 formed a company to promote the enterprise. The Colombian government granted exclusive privilege to the company in 1879, and active work began in latter part of 1881. It was estimated that the canal would cost $120,000,000, but after expending $280,000,000 only a small portion of the necessary excavation had been effected and the company dissolved in 1889. Later charges of fraud were brought against the company by the government and several officers were sentenced to imprisonment, but in the case of De Lesseps the sentence was suspended. Though he did not live to realize the great enterprise of connecting the Caribbean Sea with the Bay of Panama, it is reasonably certain that he did not calculate an impossibility. Among the honors bestowed upon him are the grand cross of the Legion of Honor in 1869, membership in the French Academy in 1884, and knighthood by Queen Victoria. In 1886 he was a delegate to the dedication of the Statue of Liberty in New York harbor.

LESSER ANTILLES. See **Leeward Islands** and **Windward Islands.**

LESSING (lĕs'ĭng), **Gotthold Ephraim**, scholar, dramatist, and critic, born in Camenz, Germany, Jan. 22, 1729; died in Brunswick, Feb. 15, 1781. His father was a minister of the Orthodox Lutheran school, and first sent young Gotthold for elementary training to Meissen, but later to the University of Leipsic, where he began a theological course. Soon after he developed a fondness for literary research, gave up theology, and subsequently settled at Berlin, where he began, in 1748, to write for periodicals in connection with his friend Mylius. His first work was a quarterly, entitled "Contributions to the History and Improvement of the Theater." He also translated a work from the Spanish contributed to "Vosses' Gazette," and published a collection of poems entitled "Trifles." His "Sarah Sampson" appeared in 1755, and by it he introduced an original character and new life into German literature. General Tauentzien, governor of Silesia, selected him as secretary in 1860, after which he resided five years in Breslau, when he returned to Berlin and published "Laocoön; or, The Limits of Painting and Poetry." He became director of the national theater at Hamburg in 1767, and while there wrote his "Hamburg Dramatics." The criticism contained in this work aroused opposition, on account of which he left Hamburg, but was selected librarian by the duke of Brunswick. Other works published by him are "Nathan the Wise;" "The Jews;" "Training of Mankind," and "Minna von Barnhelm." The name of Lessing is one of the most eminent in German literature, his influence being potent in counteracting French tendencies, and in giving to Germany a distinctly German literature in which thought, taste, and genius bring forth the beauties of that language. Perhaps no writer has been more successful in strengthening literary criticism. His style is concise, but peculiarly vigorous.

LETHE (lē'thē), a stream mentioned in Grecian mythology, which flowed gently and silently in a secluded vale of Elysium, and whose waters had the property of dispelling care and producing utter forgetfulness of former events. The Pythagorean doctrine of the transmigration of souls implied that after they inhabited Elysium a thousand years they were destined to animate other bodies on earth, and, before leaving Elysium, they drank of the waters of the River Lethe in order that they could enter upon their new career without any remembrance of the past.

LETTER, as commonly understood, the term applied to a written message or communication. Previous to the rapid transit of intelligence by railway, steamboat, telephone, and telegraph, letters served a quite different purpose than they do at present in that they assumed the form of epistles. These writings now constitute a large part of the literature that has come down to us through the centuries. Many of the letters of Cicero, Pliny, and Seneca are included in ancient literature. The epistolary writings of the early Christians, including the epistles of the New Testament, belong to this class. Among the literary men of more recent times are many writers who delighted to contribute messages of friendship and intelligence to others, and for this purpose wrote letters, sometimes of a private, but also of a public character. We find in the literature of all languages men who were especially noted for extraordinary ability in letter-writing. Such, for instance, were Walpole, Cowper, and Gray among the English; Goethe, Humboldt, and Schiller of the Germans; and Voltaire and Madame de Sevigne among the French.

LETTERS OF MARQUE AND REPRISAL, a commission issued by a state or government authorizing the bearer to pass beyond the boundaries of his own country for the purpose of capturing prizes of the enemy, consisting of their persons or goods. The term letters of marque signifies a license from the government to pass beyond the limits or jurisdiction of one's own country, and reprisal signifies taking in turn.

LETTS (lĕts), a people inhabiting portions of Russia, largely in Livonia, Courland,

Kovno, and Vitebsk. They are Slavonic, closely allied to the Lithuanians, and number about 1,000,000. In 1586 the Lutheran Catechism was translated into the Lettic language. There are many writings of value in that tongue, but many of the race have been Germanized.

LETTUCE (lĕt'tĭs), an annual plant cultivated in gardens, and which serves as a salad. There are many species, most of

LETTUCE.

which attain a height of two feet, bear yellowish flowers, and have variously formed leaves. The plant is in its best state when from four to six inches tall, when it is tender and best adapted as a food. Lettuce has been cultivated in gardens since very early times, but does not grow spontaneously in any country. The species include both greenish and purplish varieties. Some have heads resembling those found in several kinds of cabbage.

LEUCADIA, or **Santa Maura**, an island on the west coast of Greece, having an area of 180 square miles, and a population of 20,980. It is traversed by hills, but contains a fair proportion of fertile soil, and produces cereals, fruits, and wine. In the southern part is a line of white cliffs, the highest of which is about 2,000 feet, known as the Leucadian Rock, or the Lover's Leap, so called from despairing lovers throwing themselves from it.

LEUTHEN, a small town of Germany, situated in Lower Silesia, and celebrated on account of a battle fought there on Dec. 5, 1757, by which Prussia recovered most of Silesia. The Prussian army consisted of 35,000 men under Frederick the Great, while 90,000 Austrians were under Prince Charles of Lorraine, but the former won a decisive victory.

LEUTZE (loit'seh), **Emanuel**, eminent painter, born in Gmünd, in Würtemberg, Germany, May 24, 1816; died in Washington, D. C., July 18, 1868. He accompanied his parents to Philadelphia in infancy, where he attended school and developed skill in elementary drawing. His first product was completed in 1840, when he painted "An Indian Gazing at the Setting Sun," and the following year returned to Germany, where he studied at Düsseldorf under K. F. Lessing. In 1859 he returned to America and produced many historical paintings in his studio in New York City. He was made a member of the National Academy in 1860, secured a prize at the Brussels art exhibition, and painted a fine picture for the staircase of the Washington Capitol, entitled "Westward Ho." Others of his products are "Columbus in Chains;" "Washington at Monmouth;" "Columbus Before the Queen;" "Settlement of Maryland by Lord Baltimore;" "Washington Crossing the Delaware," and "Storming of Teocalli."

LEVANT (lĕ-vănt'), an Italian term meaning the East. It is applied in a restricted sense to the Asiatic coasts of the Mediterranean from Constantinople to Alexandria, Egypt, but in a more general sense to the regions from Italy to the Euphrates and the Nile.

LEVEE (lĕv'ē), a French term applied to embankments constructed to prevent water from overflowing level tracts of land, and which has come to be used extensively in various languages. The most important levees of America are those of the lower Mississippi, which border the river for a distance of 500 miles. They serve to confine the stream to its natural channel. Other levees of vast extent are those of the Ganges River in Asia, of the Po River in Italy, and those of Holland, the latter being more commonly called dams.

LEVEL, an instrument for indicating a horizontal line, for determining the true level, or to ascertain the difference of elevation between various places. It is used in engineering, architecture, surveying, drainage, and in various other arts. There are many devices for this purpose, among them those in which the horizontal line is determined by a bubble of air floating in a fluid contained in a glass tube, as in a spirit level; those in which the horizontal line is determined by the surface of the fluid at rest, as in the water and mercurial levels; and those of the simpler forms used by carpenters and masons, in which the vertical line is determined by a plumb line and the horizontal by a line perpendicular to it.

LEVER (lē'vẽr), an inflexible bar or rod moving upon a fixed point called the fulcrum or prop, and having the weight to be moved and the power to move it applied at two other points. The lever is one of the mechanical powers. It includes three classes, being numbered according to the relative positions of the fulcrum, the points of application, and the force of the weights.

In levers of the first class the fulcrum is between the force and the power, as in a pump handle, in which the hand is the power, the water lifted the weight, and the pivot the fulcrum. Levers of the second class have the weight between the fulcrum and the force, as an oar, in which the hand is the power, the boat the weight, and the water the fulcrum. In levers of the third class the power is applied between the fulcrum and the weight, as in the treadle of some grindstones; the front end resting on the ground is the fulcrum, the foot is the power, and the force is transmitted by the rod to the weight, the wheel above. In the lever advantage is gained mainly at a loss of time, that is, a heavy weight may be lifted by a small power passing through a greater distance. The force being smaller, it passes through a greater distance than the weight, and for that reason is able to overcome material resistance.

LEVER (lē'vẽr), **Charles James**, novelist, born in Dublin, Ireland, Aug. 31, 1806; died in Trieste, Austria, June 1, 1872. In 1827 he graduated from Trinity College, studied medicine at Göttingen, Germany, and returned to practice medicine in Ireland. His first production was "Charles O'Malley," a work in which many of the jovial incidents of college life were recorded. In 1832 he visited America, making a study of Indian life, and soon after contributed to the "Dublin University Magazine," becoming its editor in 1842. The productions written during later life are less jovial, but more artistic and thoughtful. In 1845 he held a diplomatic position at Florence, became vice-consul at Spezzia in 1858, and was appointed to a like position at Trieste in 1857. Among his writings are "Knight of Gwynne;" "A Day's Ride;" "Tom Burke;" "Dodd Family Abroad;" "Fortunes of Glencore," and "St. Patrick's Eve."

LEVERRIER (lĕh-vă-re-ā'), **Urbain Jean Joseph**, celebrated astronomer, born at St. Lô, France, March 11, 1811; died at Paris, Sept. 23, 1877. After obtaining the necessary training, he was admitted to the Ecole Polytechnique in 1831, and subsequently received an appointment as an engineer in connection with the tobacco board, a commission to supervise the manufacture and sale of tobacco. In 1837 he became a teacher of astronomy at the Ecole Polytechnique, and while there made searching study of astronomical phenomena. He took observations of the transit of Mercury in 1845, publishing accounts of his discoveries, by which he secured admission to the Academy of Science the following year. Subsequently he discovered the planet Neptune, and for this received the grand cross of the Legion of Honor and a professorship in the faculty of sciences at Paris. In 1841 he was elected a member of the general assembly, became senator in 1852, and was director of the observatory of Paris from 1854 until the time of his death, except only the three years 1870-73.

LEVI, the third son of Jacob and Leah. He is conspicuous in Jewish history on account of joining his brother Simeon in the massacre of the inhabitants of Shechem, for which Jacob pronounced the curse that they should be scattered among Israel. However, the Levites were set apart for the priestly office, enjoying privileges and dignities above the other tribes. The house of Levi was divided into three families, as descendants from Levi's sons, Gershon, Kohath, and Merari. This tribe included Moses and Aaron. In the time of David the Levites numbered 38,000.

LEVIS (lā-vē'), a city of Levis county, in the province of Quebec, Canada, on the St. Lawrence River, opposite Quebec. It is extensively connected by railroads. The surrounding country is fertile. Its manufactures embrace woolen goods, boots and shoes, furniture, machinery, and soap. The city has several fine schools and churches. Population, 8,375.

LEVITES (lē'vĭts), the descendants of Levi, who were selected as the guardians of the sanctuary of Israel and ministers of worship. When the lands of Palestine were divided, the three divisions of Levites, the descendants of the three sons of Levi, Gershon, Kohath, and Merari, received no territorial possession, but were given tithes of the agricultural products. There were properly two classes of Levites, the entire tribe considered collectively, and those who were designated the sons of Aaron. Forty-eight cities of Canaan were assigned to the tribe of Levi, of which the priests were to occupy thirteen. . The duty of preserving and interpreting the law was assigned to the Levites in connection with their other duties, and at the feast of tabernacles they were to read the law before the people once every seventh year. They lost their importance after the revolt of the ten tribes, but their lineage has been kept up more distinctly than that of any other, and even to the present time there are those who claim to be pure descendants from Aaron.

LEWIS, Meriwether, explorer, born near Charlottesville, Virginia, Aug. 18, 1774; suicided near Nashville, Tenn., Oct. 11, 1809. After attending an elementary school, he volunteered his services in the militia, and in 1794 took part in suppressing the Whiskey Insurrection in western Pennsylvania. In 1800 he was promoted to the rank of captain in the regular army, but served as private secretary of President Jefferson in 1801-03. Congress appointed him and Capt. William Clarke, on the recommendation of President Jefferson, to conduct an exploring expedition to the northwestern portion of the United States. In the latter part of 1803 they entered upon the expedition with a company of twenty-eight men, wintered at the mouth of the Missouri River,

and in the spring of 1804 began their ascent of the Missouri in boats.

The second winter was passed at 47° 21′ north latitude among the Mandan Indians, and in the spring of 1805 they continued the exploration of the Missouri, which they followed from the confluence of the Milk River to Red Rock Lake in the southwestern part of the state of Montana. Procuring horses and a guide from the Shoshone Indians, they crossed the mountains westward, and in October reached a tributary of the Columbia, which they descended in canoes, and on November 15 they reached the mouth of the Columbia. The distance traveled was something over 4,000 miles, and in their course they came in contact with Indians never before met by white men, collected valuable data, and were the first to reach the Pacific by a tour across the northern part of the United States. The winter was spent on the Columbia.

In the spring they started on a return tour, reaching the Missouri in the summer and the Mississippi in September, 1806. After arriving at Washington, extensive reports were published of the expedition and its results, which attracted much attention and gave the people of America a clear idea of the vastness of the Louisiana Purchase. The members of the expedition were liberally rewarded by grants of land. Lewis was made governor of Missouri territory, in which position he served until 1809, when his mind became influenced by the change from his former activities to curtailment in office work, and led to his sad death.

LEWISTON (lū′ĭs-tŏn), a railroad and manufacturing city of Maine, in Androscoggin county, on Androscoggin River, about thirty-five miles north of Portland. It has electric car lines, pavements, city waterworks, public lighting, and is connected with Auburn, on the opposite side of the river, by several bridges. The river has a fall of about fifty feet, by which immense waterpower is secured through a canal, and vast manufacturing establishments supported. Its manufactures include cotton and woolen goods, clothing, machinery, leather products, belts, hats, brooms, and utensils. The surrounding country is agricultural, giving the city an important trade in cereals and live-stock. It has a fine public school system, and is the seat of Bates' College. This college is a Free Baptist institution founded in 1863, and endowed amply, Benjamin E. Bates contributing $200,000. The city also has an auditorium, a public library, and a beautiful public park. Population, 1900, 23,761.

LEXINGTON (lĕk′sĭng-tŏn), an important city of Kentucky, in Fayette county, twenty miles southeast of Frankfort. It is extensively connected by several important railroads, giving it considerable advantages in transportation facilities. The city is situated in the celebrated blue grass region, has beautiful streets, modern municipal improvements, and is noted for its extensive manufactures and commercial trade. Besides a fine school system, it contains Kentucky State College, Hamilton Female College, Kentucky University, Sayre Female Institute, and St. Catherine's Academy. The manufactures embrace cordage, spirits, copper products, saddlery, hemp and cotton goods, clothing, carriages, and machinery. There is a large trade in Bourbon whiskey, tobacco, cereals, and fine stock. The public parks and a library have been liberally supported. A fine monument to Henry Clay is among the interesting structures that adorn the city. Population, 1900, 26,369.

LEXINGTON, county seat of Lafayette county, Missouri, on the Missouri River, forty miles east of Kansas City. Its convenient location on the river and railroad facilities provide considerable trade advantages. There are good municipal improvements and several fine public schools. It is the seat of Wentworth Military Institute. Population, 1900, 4,190.

LEXINGTON, county seat of Rockbridge county, Virginia, situated on the North River, in a fertile agricultural and stock-raising country. It has good railroad connections and municipal improvements, and is the western terminus of the James River and Kanawha Canal. There are manufactures of flour, machinery, and ironware. Besides a good public school system, it contains the Washington and Lee University, and the Virginia Military Institute. It is also historic because of its being the burial place of Thomas J. Jackson and Robert E. Lee, the two most distinguished generals of the Confederate army. Population, 1900, 3,203.

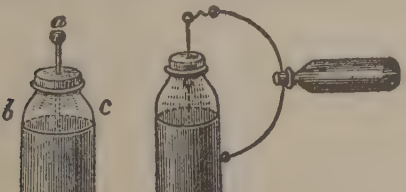
LEXINGTON, a town of Middlesex county, Massachusetts, ten miles northwest of Boston. It is celebrated as the site of the first battle of the Revolution, which occurred there April 19, 1775. The British had secretly dispatched a force from Boston to seize the military stores collected at Concord, the news of which was spread by Paul Revere. Accordingly the call to arms was sounded, and the militia was armed. When Major Pitcairn reached the village with British troops he found minute-men drawn up on the green. Finding that they refused to disperse at his command, he promptly ordered his men to charge, but the militia held its ground until the British were reënforced, when they fell back and Major Pitcairn moved on to Concord. On returning from Concord, the British were attacked at Lexington and pursued by a galling fire from all sides. Exhausted by their march of eighteen miles and their fast of fourteen hours, the British fell into a disorderly flight, and would probably have been destroyed, if Lord Percy had not come forward with heavy reënforcements from Boston. The British lost 273 men, the Americans ninety-three, and the engagement so

aroused the colonists that within a week 16,000 men were besieging General Gage in Boston. Lexington contains a monument erected in 1799 to commemorate the battle. The town has a population of 3,831.

LEYDEN (lī'dĕn), a city of Holland, on the Old Rhine River, twenty-two miles southwest of Amsterdam. It is the oldest city in Holland. In 1640 it had a population of 100,000, but gradually declined until the beginning of the last century. Since then the city has gained considerably in population and importance. There are manufactures of cotton and woolen goods, earthenware, machinery, clothing, and musical instruments. It has a number of splendid churches and public schools, and is the seat of the celebrated Leyden University. This university has a valuable library, thirty-five professors, and 850 students. Its municipal facilities are modern, including electric lights and street railways, and it has important railroad connections. The colony at Plymouth, Mass., was founded by the Pilgrims who sailed from Leyden. Its present population is 45,472.

LEYDEN (lī'dĕn), **Lucas Van**, painter and engraver, born in Leyden, Holland, in 1494; died in 1533. He studied under his father, and later entered the school of Cornelius Engelbrechtsen, a painter of Leyden. When only twelve years of age, he painted a celebrated portrait of St. Hubert. In 1508 he completed his "Mahomet and the Monk Sergius," and subsequently devoted attention to painting and engraving in various lines. The productions of Leyden are considered of much value for the reason that they possess remarkable clearness and delicacy of color, while the expression is uniformly beautiful. Besides painting many events in sacred history, his works show incidents of his time and include portraits of noted men.

LEYDEN JAR, an electric accumulator introduced in 1746 by Munschenbroek of Leyden, Holland. It is constructed by coating the inside and outside of a glass jar with tin foil, for about two-thirds of the height, as shown in the accompanying illustration at *b* and *c*. The inside coating is connected with a metallic rod, *a*, having a brass knob at the top. To charge the jar the knob is brought near the conductor of an electric machine, and a number of sparks are passed into the jar. The inside coating is charged positively and the outside negatively, and, if one hand be placed on the outer coating and the other on the knob, a discharge passes through the body and gives a more or less severe shock. Several jars connected with one another, having their inner and outer coatings respectively in contact, constitute a battery of Leyden. In such a battery it is possible to collect a quantity of electricity equal to the sum of the charges from each jar, and which may be passed through a number of persons joined hand to hand, while by a very large battery it is possible to melt metallic wires, rupture bad conductors, and otherwise utilize its force.



LEYDEN JAR.

LEYS (līs), **Jean Auguste Henri**, Flemish painter, born in Antwerp, Belgium, Feb. 18, 1815; died there Aug. 26, 1869. After securing a liberal education, he produced many works of art of such excellent merit that he may be regarded a type of modern Flemish masters. His productions are largely historical, representing scenes from the history of his own country, and exhibiting a beauty of coloring and studied outline rarely excelled. Leopold I. made him a baron in 1862. His best paintings include "Faust and Wagner," "New Year in Flanders," "Albert Dürer at Antwerp," and "Faust and Margaret."

LHASSA (hläs'sä), or **Lassa**, the capital and principal city of Thibet, situated on the Upper Brahmaputra River, and surrounded by elevated mountain ranges. It has been held sacred by the Buddhists for many centuries, is a commercial center of considerable magnitude, and has a diversity of manufactures. There are several monastic establishments, to which people from Thibet and Mongolia are attracted in great numbers. Formerly it was walled and fortified, but the fortifications were destroyed by the Chinese in 1742. The population is variously estimated, including Chinese, Hindus, and Arabs. It is thought to embrace about 50,000.

LIANA (lī-ā'nà), the name applied by French travelers to a large variety of twining and climbing plants of tropical forests, but now commonly used by travelers of all nations. Most lianas have woody, rope-like stems and climb to the tops of trees, but sometimes run very far along the ground. Some species, such as the clematis and honeysuckle, are found in colder climates. In many of the hot countries having excessive rainfall the lianas grow to the tops of the highest trees, often entwining the trunks with such force as to suppress life, and in other instances bearing heavily upon the branches, even breaking down large trees by their heavy vines and foliage. In many localities a dense net-work is formed among the forest trees, making it almost impossible to penetrate through them without cutting passages, while animals keep open narrow paths by continuous use, or pass from bough to bough along the heavier vines. Many species bear beautiful flowers, others possess medicinal properties, while some are used in

the manufacture of baskets and small wooden ware. The Amazon valley of South America, the lake region of Africa, and tropical Asia present notable districts in which lianas thrive.

LIAS (lī'as), in geology, a formation situated at the base of the Jurassic or Oölitic deposits. It consists principally of thin beds of blue or gray limestone, becoming light-brown when exposed. The Lias formations contain abundant marine fossils, among them those of fishes, reptiles, and mollusks, but there are also numerous remains of plants.

LIBEL (lī'bĕl), the act of making an attack in writing, printing, or by signs, upon the character or reputation of another, differing from slander, in that the latter constitutes a similar injury by spoken words. While liberty of speech and the press is recognized in all the states, both are restricted to an extent whereby the good name and character of all are protected. If statements that are true as an entirety be published against an individual, the act of publication is justifiable. However, in some states it has been held necessary to show that the publication was made for justifiable reasons and with good motives.

LIBERAL REPUBLICAN, a party branching off from the regularly organized republican party in 1870-72. It declared in favor of tariff reform, universal amnesty and suffrage, and absolute opposition to ku-klux disorders. In 1870-71 the liberal republicans fused with the democrats in Missouri, attaining considerable success, and in 1872 united with the democrats in supporting Horace Greeley for the presidency. Subsequently they reunited quite generally with the republicans.

LIBERAL UNIONIST, a party formed in England in 1886, under the leadership of the marquis of Hartington, in opposition to the policy of Gladstone. It was designed by the latter that the lands in Ireland be purchased and ultimately owned by the tenants, which the liberal unionists opposed, and the movement likewise contended against home rule. The party was represented in all parts of Britain. It supported about 250 branch organizations, elected ninety-four members to parliament, and subsequently merged into the conservative party.

LIBERIA (lī-bē'rĭ-a), a republic of Africa, situated on the northern coast of Guinea, and extending northeast from Cape Palmas. The southeastern boundary is formed by the Cavally River, the northwestern by the Manua River, and it extends inland from the coast a distance of about 250 miles. Its coast line includes fully 350 miles. It has an area of about 75,000 square miles, and a population of 1,550,000. The republic was formed in 1821 by liberated slaves from America, who at present number about 25,000, including American descendants, and the independence of the republic was recognized by the United States and other governments in 1847. The government is under a constitution modeled after that of the United States. Under it the executive authority is vested in a president, who is elected for two years. He has the assistance of a cabinet, including the departments of state, justice, interior, finance, war, marine, and ports.

The legislative power of Liberia is vested in a congress of two branches, the senate and the house of representatives. There are eight senators, who are elected for four years, and the house of representatives is constituted of thirteen members, these being elected for two years. No standing army is maintained, but all able-bodied male citizens are members of the militia and are liable to be called upon when necessary. The government also maintains a number of small gunboats. Slavery is prohibited, religious worship entirely free, internal improvements encouraged, and a system of elementary schools supported by taxation. Many of the natives have not made material advancement in educational arts, but in the main the republic has not been a disappointment. Its influence has been extending locally. In 1899 there was some discussion of a protectorate by the United States, Germany, and Great Britain, under which it was hoped to increase native obedience to law, and also intercept encroachment of the French upon its territory. However, the republic is still entirely free from European claimants.

The coast regions of Liberia form an undulating plain, but through the interior are mountain ranges, with considerable elevations in the northern part. It is drained by numerous streams, possesses fertility of soil, and has some valuable mineral deposits, though mining has not been developed extensively. The principal exports embrace sugar, coffee, palm kernels and oil, cocoa, ivory, rubber, and hides. Hardware, earthenware, cotton goods, machinery, and utensils are imported largely. The principal import trade is with Germany, but there are also growing commercial relations with the United States, Britain, Holland, and France. Monrovia is the capital and principal seaport, and has a population of 6,120. Other cities are Buchanan, 5,000; Edina, 5,000; Harper, 3,000; and Robertsport, 1,200.

LIBERTY PARTY, a political organization of the United States formed in opposition to slavery. Though it did not attain a large membership, it effected much in the way of forming public opinion. Among its members were such eminent men as Salmon P. Chase, Louis Tappan, and Samuel Lewis. James G. Birney was its candidate for president in 1840, receiving 7,059 votes. He was also its presidential candidate in 1844, when he received 62,300 votes. In 1848 the party merged into the free-soil party.

LIBRARY (lī'brā-rỹ), a term used to designate a collection of books and pamphlets kept for reading and consultation, and

also to describe a building containing such a collection. The different classes of libraries include those of private persons, schools, and other educational institutions, and those of states and nations. In treating this subject particular attention is directed by most writers to the larger public libraries, but it is certain that private libraries are by far the most numerous and as a whole constitute collections of books and manuscripts representing vast value. The earliest public library of which we have any knowledge was founded by the Assyrians in the 8th century B. C., but it is known that libraries existed in Babylon, Egypt, and other ancient countries at a very early date. According to Strabo the first private library was that of Aristotle, in the year 334 B. C., but public libraries existed from times much earlier. A public library was founded at Athens about 540 B. C. by Pisistratus. The celebrated Alexandrian library, established about 298 B. C. by Ptolemy I., was greatly damaged in the Egyptian campaign of Cæsar, in 47 B. C., and was finally destroyed in 640 A. D. by Caliph Omar. The libraries established under the ancient civilizations, though voluminous, differed largely from those of the present in that printing had not been invented. At that time writings of the different classes were preserved by inscriptions on skins, papyrus, and stone. In Persia, at the time of its greatest prosperity, vast libraries were established. The Hebrews likewise exercised much care in the collection of books in secure archives.

The king of Pergamus, Eumenes II., established a library of 200,000 volumes, which passed to the care of Eumenes III., and later this collection came into the possession of Mark Antony, who transported it to Alexandria as a present to Cleopatra. Julius Cæsar was particularly anxious to build up a vast public library containing all the valuable works of Greek and Latin writers, but his early death left the project to be carried out by Octavianus Cæsar. The two libraries established by him were the Palatine and Octavian, the former existing up to the time of Pope Gregory I., but these and other libraries suffered extensively by the invasion of the Huns, Goths, Vandals, and other semi-barbaric tribes, much of their contents being mutilated or destroyed in the conflicts of war. Constantine collected a vast number of books devoted to Christianity that had escaped the Diocletian persecution, and this library, being enlarged at different times, included fully 120,000 volumes, but in the 8th century many of its contents were destroyed. Divers remains of ancient libraries have been preserved. It is in this way that former civilizations contribute to the extension of knowledge and culture, since all succeeding generations draw upon the experiences and writings of master minds who labored in the past. The civilized countries of all grand divisions and islands have libraries of a greater or less number of volumes, and as arts and sciences extend add to their collections.

The Bibliotheque Nationale at Paris, France, is regarded the largest library in the world. It was instituted in the reign of King John, and since then has been added to at various times until at present the total collection is thought to include 2,295,000 volumes, though an exact count has not been made since 1791. France is noted for its numerous libraries, both public and private. The public libraries belong largely to learned societies, educational institutions, and to the state. There are libraries of more or less value attached to all the public schools, and these are maintained by public taxation. Paris has five libraries, aside from the great national library, in which are 125,000 volumes, and in the country at large are fifteen libraries containing books and manuscripts equally numerous.

The German-speaking countries, including Germany, Switzerland, the Netherlands, and large parts of Austria, Belgium, and Russia, are noted for their many large libraries; in this they stand first among European countries. The want of political unity of various cities and provinces has made this condition possible. In Germany proper are several thousand excellent libraries, all of which are open to the different interests for study and research. The most important of these include the national library at Berlin with 1,000,000 volumes; Breslau, 400,000; Darmstadt, 400,000; Dresden, 400,000; Heidelberg, 350,000; Leipsic, 750,000; Munich, 1,200,000; Strasburg, 525,000; Stuttgart, 450,000; Tübingen, 250,000; and Würtzburg, 300,000. Those of Austria are not so numerous, but likewise represent a vast value, the largest being in Vienna, where the national library has 500,000 volumes. The most noted library of Switzerland is the one at Basel, having 150,000 volumes; in Belgium, the Brussels library has 375,000 volumes; in Holland, the library of The Hague has 225,000 volumes.

The libraries of Italy are especially valuable in that they contain many rare manuscripts of antiquity and products of Italian masters. Among the extensive collections are the Florence library with 425,000 volumes; the Vatican library at Rome, 250,000 volumes; Padua, 160,000 volumes; and Venice, 275,000 volumes. The largest library of Denmark is at Copenhagen, having 500,000 volumes; the largest of Sweden at Stockholm, with 275,000 volumes; the largest of Spain at Madrid, with 425,000 volumes; the largest of Russia at St. Petersburg, with 1,200,000 volumes; the largest of Greece at Athens, with 155,000 volumes; the largest of China at Shanghai, with 15,000 volumes and the largest of Japan at Tokio, with 75,000 volumes.

The libraries of Great Britain include those in all parts of the United Kingdom, and also in the cities and institutions of the colonies. Attention was first given to the

collection of vast libraries in Britain in the 17th century, since which time they have steadily increased in size and value. The most extensive library of Great Britain is the one in connection with the British Museum, which contains 1,500,000 volumes of books, 50,000 manuscripts, and 45,000 charters. Other noted libraries embrace the one at Cambridge University with 225,000 volumes; Edinburgh, 275,000 volumes; Bodleian Library, Oxford, 500,000 volumes; Glasgow, 130,000 volumes; Trinity College, Dublin, 200,000 volumes; and Birmingham, 115,000 volumes. At present the most extensive libraries in British colonies are in Australia and Canada, but there are many fine collections in India. The largest of Australia is at Melbourne, containing 125,500 volumes; and of Canada at Ottawa, having 120,500 volumes.

The library movement began in the United States at an early period by gifts of philanthropists and government aid, but its most potent impetus was not reached till the middle of the last century, since which time rapid strides have been made. Besides many private libraries of much value, there are fully 4,500 public libraries that contain 1,000 volumes and upward, and these now aggregate 40,000,000 volumes. The congressional library building at Washington is the most extensive in the world. It contains ample accommodation for 4,500,000 volumes, but at present it has 900,000 books and about 250,000 pamphlets and manuscripts. Other great libraries include the large library of San Francisco, which has 215,000 volumes; Yale College, 200,000; Chicago public library, 250,000; Chicago University, 400,000; Annapolis, 125,000; Peabody Institute, 120,000; Boston Athenæum, 190,000; Harvard University, 590,000; public library, Boston, 750,000; Detroit public library, 115,000; Albany state library, 165,000; Brooklyn, 120,000; Astor library, 300,000; Columbia College, 260,000; New York Mercantile, 250,000; Cincinnati public library, 250,000; Philadelphia Library Company, 180,000; Philadelphia mercantile library, 175,000; University of Pennsylvania, 140,000; and St. Louis library, 120,000. School libraries are encouraged especially by taxation in many of the states, a system under which library privileges have been carried not only to the smaller towns, but also to many rural districts. Solomon's adage, that "Of making many books there is no end," is emphasized everywhere in the United States.

LICHEN (lī'kĕn), an order of flowerless or cryptogamous plants. All plants are classified as belonging to the flowering or flowerless division, lichens being included with the latter. They are found native in all zones up to the snow line. These plants are composed of loose cellular tissue, a slender white-celled portion now conceded to be a parasitic fungus, and a number of globular greenish or bluish cells upon which the fungus cells prey. They contain neither stems nor leaves, but form gray, brown, or yellowish crust-like patches on trees, fence rails, rocks, and also on the ground, but derive their nourishment entirely from the

LICHENS.

air. In the most northern portions of the Arctic regions to which any form of vegetation exists, they constitute important means for sustaining animal life, especially of the reindeer. Icelandic moss and several other varieties yield dyes and medical properties. Some species are used for food.

LICK, James, philanthropist, born in Fredericksburg, Penn., Aug. 25, 1796; died Oct. 1, 1876. After securing an education, he spent a number of years in South America, and in 1847 settled in California, where he became immensely rich. Besides supporting many local enterprises with much liberality, he donated property as follows: $60,000 to erect a monument in Golden Gate Park to Francis Scott Key; $100,000 to found an old ladies' home in San Francisco; $100,000 for a bronze statuary to be erected at the city hall of San Francisco; $150,000 for the construction and support of public baths in San Francisco; $540,000 to establish the California School of Mechanical Arts, and $700,000 to build the Lick Observatory of the University of California.

LICK OBSERVATORY, an institution founded by an endowment of James Lick, and forming a part of the University of California. It is situated twenty-five miles east of San Jose, California, on one of the summits of Mt. Hamilton, and contains an object-glass of thirty-six inches in aperture. In making the gift it was provided that the instrument "should be superior to and more powerful than any telescope ever made." The remains of Lick were placed in the vault at the base of the thirty-foot pier that supports the great telescope.

LICORICE (lĭk'ŏ-rĭs), a class of leguminous plants native to southern Eurasia and Africa. They are cultivated for the juices found in the roots, which serve in preparing a medicine valuable in the treatment of throat and catarrhal diseases. The plants include several varieties, attain a height of about four feet, bear violet-colored flowers, and have roots growing about three feet into the ground. Their leaves are alternate and pinnate, and the plants have few branches.

The juices are pressed from pulp prepared by crushing the roots of plants having at least three years' growth; the liquid portions are evaporated by heating, and the solid parts are made into sticks, such as are commonly purchased in the market. They are packed for shipment with bay leaves. The medicinal qualities arise from the property of the licorice in aiding expectoration and its healing influence upon the irritated portions of the mucous membrane. Licorice in a pure state has decided medical virtues, but there are many adulterations. The only species of licorice found in America is a plant known as lepidota, which thrives in portions of the Mississippi valley, especially in Missouri.

LIDDON (lĭd'ŏn), **Henry Parry**, clergyman, born in Stoneham, England, Aug. 20, 1829; died at Weston-super-mare, Sept. 9, 1890. He graduated at Oxford in 1850, was ordained clergyman in 1854, and became vice-principal of the theological school at Cuddesdon. In 1864-70 he was prebendary of Salisbury Cathedral; in 1870-90 resident canon of St. Paul's, London, and also served as professor at Oxford. His ability as a pulpit orator attracted large congregations, thereby exercising marked influence in Christian relations. He published valuable works relating to Christianity, many of which have had a wide reading. His writings embrace "Divinity of Our Lord and Saviour;" "Life of Edward Bouverie Pusey," and "Letters from Egypt and Syria."

LIEBIG (lee'big), **Justus, Freiherr von**, eminent chemist, born in Darmstadt, Germany, May 12, 1803; died in Munich, April 18, 1873. He studied at Bonn and Erlangen, receiving a degree at the latter in 1822, and later took additional work at Paris. While there he attracted the attention of Alexander von Humboldt by a treatise on the "Fulminates and Fulmic Acid," and in 1824 became professor of chemistry in the University of Giessen, a position in which he labored successfully for twenty-five years. The efficiency of his work had an influence upon students of chemistry, and attracted the attention of scholars in foreign countries as well as all parts of Germany, adding greatly to the reputation of his school. Besides being regarded the founder of organic chemistry, he reformed agricultural arts, introduced the use of sewage of cities for fertilizing the soil, and discovered the preparation of infant food by making extracts of beef. Many distinguished honors were placed upon him, among them a hereditary baroncy by the grand duke of Hesse, and recognition by learned societies and universities of America and Europe. In 1852 he became professor at the University of Munich, and in 1860 was elected president of the Munich Academy of Sciences. His writings embrace "Dictionary of Chemistry;" "Organic Chemistry in Its Application to Agriculture;" "Chemical Letters;" "Chemistry of Food," and "Annals of Chemistry and Pharmacy." Many of his works have been translated into various languages. His many discoveries are due to his indomitable perseverance and extraordinary power of generalization.

JUSTUS LIEBIG.

LIECHTENSTEIN (lēk'tĕn-stīn), an independent principality in Europe, which formed a part of the German Confederation until 1866. It is bounded on the northeast and east by the Austrian possession of Vorarlberg, south by the Swiss canton of Grisons, and west by the Rhine River, by which it is separated from the canton of St. Gall. Its area is sixty-two square miles, and the population 11,168. Vaduz, or Liechtenstein, is the capital and chief town. The surface is quite mountainous, but generally fertile, and considerable interest is taken in agriculture, fruit growing, stock raising and mining. The language is German. Several fine schools and institutions of higher learning are maintained. The prince of Liechtenstein, who has his chief residence in Vienna, is at the head of the government, and is assisted by a diet of fifteen members, three of whom are appointed by the prince and the remainder elected by the people. There is no standing army, and the region is joined to the customs-union of Austria. The prince of Liechtenstein belongs to the Este family, an old family of Europe, which was raised to sovereign rank in the 17th century.

LIEGE (lē-āzh'), an important manufacturing and railroad center of Belgium, capital of the province of Liege, situated at the confluence of the Meuse and Ourthe rivers. It is surrounded by a rich agricultural and mining country. There are excellent railroad connections, giving the city a fine outlet for its large trade. The manufactures include machinery, cotton and woolen goods, clothing, locomotives, steam machinery, steamboats, ironware, and furniture. Among its important buildings are the Church of St. James, palace of justice, several colleges, and a university noted for its mining school. It has a thoroughly organized public school system. The city has modern municipal facilities, including waterworks, sewerage, and electric railways, but contains a number of narrow streets and illy ventilated sections. There are several fine parks, libraries, and churches. In 1691 Liege was conquered by the French. It had a varied existence during the succeeding centuries, and in 1831 became a part of the kingdom of Belgium. As a coal and zinc mining center it ranks of

much importance among European cities. Population, 162,310.

LIEGNITZ (lēg'nĭts), a city of Germany, situated in the province of Silesia, 145 miles southeast of Berlin. It is noted as a commercial and railroad center. The city has good educational institutions and modern facilities. It manufactures cotton, woolen, and linen goods, musical instruments, hardware, saddlery, and machinery. Liegnitz was the scene of a great battle in 1813, in which the French were defeated by Blücher, which is also known as the battle of the Katzbach. Population, 48,780.

LIFEBOAT, a boat constructed with a view of rendering efficient service at sea in times of shipwreck and storms. Lifeboats, to be of the highest utility, must possess extra buoyancy and have means for the self-discharge of water. They must be self-righting, possess speed, have storage room, and be strong of build. In 1785 the first lifeboat was patented by Lukin in Great Britain, but it did not prove of sufficient utility, on account of which a prize was offered for the best model of a new structure. In the contest that followed, in 1789, the premium was awarded to Henry Greathead. However, his invention did not possess the property of righting itself and discharging water, hence it proved unsatisfactory, especially in an accident on the Tyne, in 1849, when a number of persons lost their lives by endeavoring to use this lifeboat in saving persons from drowning. Accordingly the duke of Northumberland offered a prize to the person who would supply the best model of a lifeboat. In the competition that followed James Beeching was awarded the premium. However, similar boats were constructed in various countries, combining all the necessary elements of a first-class lifeboat, and the credit cannot be claimed by any one country or individual.

LIFE-SAVING APPARATUS, the devices designed for the purpose of saving lives in case of shipwreck. There are many different classes of life-preservers that have been introduced at various times, all of which have served a more or less valuable purpose. Those of modern manufacture are of especial value in that they take advantage of many methods demonstrated by experience to be of practical value. Among the different forms may be mentioned the devices made of india-rubber and inflated with air. These are constructed in several compartments with a view of insuring safety if a rupture should occur in one or more of the parts. Lifeboats have been efficient life-preservers, especially since a form of ballasting has been devised by which they right themselves if upset in the water. Mattresses stuffed with cork; jackets of inflated rubber and cork; life-buoys; trousers and suits with cork; looped life-lines, and many other devices are among the preservers now in use. All ships are provided with a supply of these for the safety of passengers and the crew.

LIFE-SAVING SERVICE, a public system maintained for the purpose of giving succor and assistance to seafarers subject to danger and shipwreck upon the sea and inland waters. All civilized nations have made provisions whereby the danger of loss of life at sea may be greatly lessened or entirely overcome within certain distances from the land. The life-saving service of the United States is among the most efficient in the world, and came into existence in 1871. It is under the control of the treasury department and a general superintendent, who has several assistants. There are about 10,000 miles of seacoast that have been divided into districts. Besides the life-saving service concerned with the sea, there is a service corps having charge of the inland waters. In the first thirty years of the existence of this department 16,112 lives were saved by the coast and inland services.

The coast service is divided into twelve districts, each of which has a number of stations. These stations are supplied with life-saving boats and various forms of life-preservers. Experienced surfmen are constantly employed, who patrol a certain beat every night and during foggy days for the purpose of watching for vessels in danger and distress. The house provided for surfmen has a station-outlook at the top, from which constant observations are made, and at night lights are displayed, while also flare lights are used to indicate that those in danger have been observed. Lifeboats are sent to the points of danger, carrying various life-preservers, and in many instances life-lines are thrown to the stranded vessel by rocket or mortar. In this way persons in danger may be safely towed to shore, or prevented from sinking until rescued. At each station is an adequate supply of provision and restoratives, by which to minister to the wants of those in need, or restore to consciousness and activity in cases of apparent drowning. Lighthouses located at various shoals and breakers have also served to guard against dangers and overcome losses at sea.

LIFE INSURANCE. See **Insurance.**

LIGAMENT (lĭg'ȧ-m*e*nt), in anatomy, the short bands of strong, white, glistening fibers by which the bones are connected at the joints. They serve also to strengthen the attachments and keep in place various organs. Capsular ligaments surround all the joints, but the structures holding the tendons of the ankle and wrist are called annular ligaments. Distinct names are applied to the many different ligaments in the human body, whereby it is made possible for anatomists to locate and describe them with facility.

LIGHT, the form of radiant energy that acts on the retina of the eye and renders visible the objects from which it comes. It

has a heating and chemical action of prime importance to plant and animal life, and neither can exist without its influence. Its importance is seen by the fact that plants growing in places from which light is partially excluded are abnormal and of little vigor, while animals lose much of their vitality and energy when wanting its influence. It has been shown successfully that sunlight is an important factor in the sanitary regulation of cities, while it materially affects the growth of children and the recovery of patients in hospitals, darkness causing failure and even death. The sun is the most important of the self-luminous bodies. Other objects giving out light include the fixed stars, certain meteors, nebulæ, and bodies in a state of phosphorescence or incandescence, though nearly all of the earth's light comes from the sun.

The undulatory theory of light is now generally accepted. According to it radiant energy is propagated in waves that vary in length, and only those that affect the eye are known as light, the others being regarded as chemical rays or dark heat. Light and energy are transferred from one place to another by means of these waves, and pass with rapidity through the luminiferous ether that fills all space; the velocity, according to Foucault, Cornu, and Bradley, being 186,427 miles a second, but the rapidity depends somewhat on the medium through which it passes. To affect the eye and produce the sensation of light, the waves must have a frequency between 392,000,000,000,000 and 757,000,000,000,000 per second, and since the frequency of the ether waves is so great, their wave lengths must be correspondingly small. Ether waves produce three classes of effects on ordinary matter: heating effects, luminous effects, and affinic effects. To produce these the waves must be correspondingly rapid, and the molecules of the body must move to and fro with a sufficient frequency, otherwise none of the effects will be manifest. Different bodies are variously affected by rays of light.

The three most important classes of bodies are called transparent, translucent, and opaque. A transparent body is one through which the light passes in such a manner that the outlines of other bodies can be seen through it, as clear glass and water. A translucent body permits light to pass through in such a manner that we cannot see through it the outlines of other bodies; such as oiled paper and ground-glass. An opaque body does not allow any light to pass through it, as wood and iron. A single line of light taken in the direction in which it is moving is called a ray; a number of parallel rays constitute a beam; and a number of converging or diverging rays form a pencil. A pencil is said to be converging, when the rays all move toward the same point; and diverging, when all are moving from the same point. Bodies are not visible unless they throw off light in all directions; therefore, both luminous and illumined bodies are visible. A body that regularly reflects light cannot be seen, as a clear glass placed in a doorway may be mistaken for an open doorway. Light, like sound, moves in straight lines, and varies inversely proportional to the square of the distance from the point. This may be demonstrated by placing an object near a light, where it receives the effects more intensely than when removed several times the distance from the luminous object.

Light is said to be reflected when a portion of the quantity falling on the surface of a body is thrown off from it. The two recognized laws of reflection are: the angle of reflection is equal to the angle of incidence; and the incident ray, the perpendicular at the point of incident, and the reflected ray, all lie in the same plane. Ordinarily the amount of light reflected depends upon the kind of material forming the surface; on the degree of polish of the surface, and on the angle at which the light strikes the surface. Glass and highly polished metals are excellent reflectors of light, though considerable light is lost even from the surface of the best reflectors. Transparent substances reflect the greater amount of light the more obliquely it falls upon their surfaces, as is the case with glass and water, and when the light falls on such surfaces at nearly right angles most of its quantity passes through the body. This is demonstrated clearly by the sun shining at noon on a water-surface, when we may look at its image without being dazzled, but shortly before sunset the image becomes quite dazzling and too powerful to be looked at steadily. The reverse is true of opaque bodies, since they reflect the greatest amount of light when it falls the most directly on the surface.

When light falls on a water-surface, a part of the light is reflected, and part of it enters the water. It moves onward in straight lines, both in the air and in the water, but the direction of the light in the water is not the same as in the air, the light being bent or refracted as it enters the water. Refraction of light always occurs when it passes obliquely from one medium to another of different density, but when it falls perpendicularly on the surface it is not refracted. The accepted rules of refraction are: first, the incident ray, perpendicular at the point of incidence, and the refracted ray all lie in the same plane; second, between the same two mediums the value of the index of refraction remains constant, whatever may be the angle of incidence; third, the light is bent or refracted toward the perpendicular at the incident surface, when the ray enters a denser medium; and from the perpendicular, when it enters a rarer medium. Optics is the science that embraces the application of mathematics to the laws of reflection and refraction. It treats of the formation of

images by mirrors and lenses, the eye, cameras, telescopes, microscopes, and other optical instruments.

It was well known to the ancients that light is propagated in straight lines. They discovered the laws of reflection, a fact attested by an ancient fable, according to which Archimedes set fire to the Roman ships of Syracuse by means of concave mirrors. Kepler discovered the law of the intensity of light. The telescope was invented by the Dutch about 1608; Jensen, Lippersheim, and Metius each claimed the honor, but it is reasonably certain that Galileo effected improvements. The law of refraction was discovered by Snell in 1621, and by its aid Descartes explained the rainbow. A half-century later Newton accidentally discovered the decomposition of light by a sunbeam coming through an opening in the window shutter, and, instead of noticing a light spot, he saw the seven colors —violet, indigo, blue, green, yellow, orange, and red. This discovery led to the invention of the spectroscope, an instrument by which rays of light may be decomposed and analyzed, and the body from which the light is emitted may be classified as to its constituents. That the seven principal colors of the solar spectrum produce the white color of light can be demonstrated by painting them on a top and whirling it rapidly, when they will unite and make a white appearance.

The different colors of objects depend on the kind of light they reflect. Thus, a body reflecting only yellow rays when touched by a beam of light is said to be yellow; when it reflects the green rays, it is said to be green; and when it reflects none of them it is called black. Newton was the first to publish an extensive treatise on the decomposition of light. Etienne Louis Malus (1775-1812), in 1808, discovered the elementary phenomena of the polarization of light, by which it was found that a single ray of light may be divided into two rays, and when so divided they possess properties not common to ordinary rays of light. Roentgen in 1896 announced the discovery of the X-ray, by which it became possible to pass them through substances opaque to ordinary light, and to make photographic views of objects in the interior, such as the bones within the living body.

LIGHTHOUSE, an elevated structure or tower placed near a seaport or some headland for the purpose of protecting vessels at night by warning navigators of danger, and also serving as a general landmark. The first structure of this character of which there is authentic record was erected at Alexandria, Egypt, about 300 B. C., and is reputed to have been elevated 550 feet above the sea. It was built by Ptolemy Philadelphus on a small island named Pharos, and this name was used to designate various structures of a like character. The most celebrated of the present time is situated near the mouth of the Garonne, in France. It has a height of 198 feet and is noted for its excellent architecture. This structure was completed in 1610, but in 1727 many alterations and improvements were made. The first lighthouses

LIGHTHOUSE.

were lighted with fires, but those of modern construction are lighted with oil, gas, or electricity, the power of the light being increased by the employment of glass reflectors, lenses, and prisms.

All modern maritime nations have a system of lighthouses on their coasts, and many also maintain a similar system to aid in the navigation of interior waters. The congress of the United States passed the first act for the establishment of such a system in 1789. In 1852 it authorized a lighthouse board, with the secretary of the treasury as ex-officio president. Under this act the coasts of the Atlantic, Pacific, Gulf of Mexico, and the Great Lakes were divided into lighthouse districts, each of which was placed under the supervision of an officer of the army or navy as inspector, and the general superintendents became subject to presidential appointment. In 1874 a lighthouse district including the Ohio, Missouri, and Mississippi rivers was added, and since then provisions have been made for maintaining lighthouses or signals in the Hawaiian Islands, Guam, and other regions under the jurisdiction of the United States.

Elevated coast points served as convenient situations for early lighthouses, but, since a lighthouse some distance from the shore is more effective, engineers began to plan the construction of the larger lighthouses some distance off the coast. To make them proof against waves and tides, as well as the storms frequent at sea, they must necessarily be built on solid rock, of which the Eddystone Lighthouse (q. v.) is a notable example. Besides, the elevation above sea-level is a material factor, since the mariner's eye is able to see the more elevated at greater distances, while the character of the light is likewise material. The principal classes of lights comprise the catoptric, diop-

tric, revolving, intermittent, and alternate. A catoptric light is one in which reflectors are formed into a parabolic curve; a dioptric light has a central lamp and the rays are transmitted by bending or diverging them through a combination of lenses; a revolving light alternately increases and decreases gradually at equal intervals; an intermittent light appears and disappears suddenly, but remains visible when at its brightest stage for some seconds; and an alternating light throws out different colors, such as red and white, at equal intervals. The United States lighthouse service includes also electric and gas buoys, fog signals, whistling-buoys, unlighted beacons, post-lights, light-ships, etc. The lights used are classified according to the different candle-power.

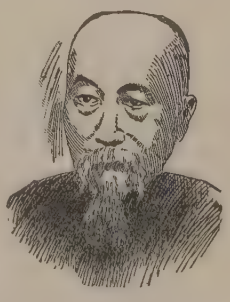
LIGHTNING, the dazzling light emitted by a large spark darting from clouds charged with electricity. Atmospheric electricity is essentially the same as that produced artificially, and is caused by friction due to dry air coming in contact with moist air, by evaporation, and various other causes. More or less electricity is always present in the air. It is largely positive electricity during a clear sky, but takes on the negative form in cloudy weather. The discharge of lightning occurs when the two—positive and negative—come in contact with each other, but when a cloud charged with electricity comes near the earth, where it is charged with the opposite kind, the electric discharge passes into the earth's crust. In the lower regions of the atmosphere electricity is white, and in the upper somewhat violet, as is the spark of an electrical machine in a vacuum.

There are five varieties of lightning—zigzag, heat, sheet, globular, and volcanic lightning. Zigzag lightning appears in irregular lines, often forked at the end. This form is thought to be due to the electric current darting among the air particles to places where the air is less dense. Heat lightning is not accompanied by thunder. It occurs during hot weather, near the horizon, and is thought to be due to the reflection of lightning below the storm. Sheet lightning is generally accompanied by thunder, appearing as an expanded flash, and by it the clouds are illumined. Globular lightning is of rare occurrence. It appears in the form of a globe of light, remaining stationary or moving slowly through the air, but its origin is not known definitely. Thunder is due to the circumstance that lightning vaporizes the rain-drops and enormously expands the air, thereby producing a partial vacuum. When the surrounding air rushes violently into the vacuum, the familiar loud report is produced. Since light has a velocity of about 186,000 miles per second, and sound travels through a medium having ordinary temperature at about 1,120 feet per second, it is easy to understand why a flash of lightning is seen some time before the sound of thunder is perceived. It requires about five seconds for a thunder clap to be heard a distance of one mile. The danger is slight at a mile distant from the place of lightning, though a severe shock is sometimes perceived.

LIGHTNING ROD, a medium designed to protect buildings against destruction or damage by lightning. The effect of a high-class lightning rod is to conduct electric movements from the ground to the sky, thereby neutralizing the contrary electricity of passing thunder-clouds, thus diminishing their liability to flash lightning. However, if the rod is not potent enough to do this, and is itself struck by lightning, it conducts the electricity to the ground. Lightning rods have a top of gilded copper or platinum at a height of from six to ten feet above the roof, thence pass in the form of a wire or iron bar to the ground, terminating from twelve to twenty feet below the surface. The lower end should extend into moist soil or be connected by an artificial conductor, else it is not effective in dispelling the danger. An area on the roof having a radius of twice the height of a lightning rod is protected; thus there should be a number of points on a building, all being connected with the main rod, and the latter protected by glass inclosures or some other non-conductor to prevent a distribution of the current.

LIGNITE (lĭg'nīt), a compact, partially carbonized vegetable matter, called also brown coal. It is an imperfect fuel immediately between peat and true coal. Lignite often retains its fibrous structure. It abounds in cretaceous and tertiary strata.

LI HUNG CHANG, statesman and diplomat, born in the province of Ngan-Wei, China, Feb. 16, 1823. In 1849 he took the Hamlin degree, became secretary in the army in 1850, and was appointed provincial judge of Chekiang. He became governor of Hiangsu in 1861, and in connection with General Gordon drove rebels out of Suchow, and later from Kiangsu. For this service he received the yellow jacket and peacock feather, and was created hereditary noble of the third class. He had charge of the naval, military, and financial affairs of the empire at the outbreak of the war with Japan in 1895, and in 1896 made a tour around the world. On returning to China he became minister of foreign affairs, received the orders of the Double Dragon in 1898, and fell into temporary disrepute for



LI HUNG CHANG.

favoring progressive measures in dress and internal improvements. At his suggestion an imperial decree was issued in 1899 directing vast improvements on the Yellow River and deepening its mouth. He is noted as a man of large intellect, liberal views toward foreigners, and is a shrewd diplomat. In managing the complicated state of affairs existing in China, owing to the Boxers and the foreign invasion of 1900-01, he rendered efficient service. He died Nov. 7, 1901.

LILAC, a shrub cultivated extensively on account of its fragrant flowers and ornamental foliage. There are many species, most of which are native to southern Eurasia, but they are now cultivated extensively in gardens, for hedges, and in parks. The flowers are variegated in color, being mostly different shades of lilac, but pure white species occur also. Among the varieties cultivated are the Persian, Charles X., and common lilacs. They have opposite leaves and flower early in spring. The common lilac, if carefully cultivated, grows to a height of twenty feet. It sends out numerous suckers.

LILIENTHAL, Otto, inventor, born in Pomerania, Germany, in 1847; died Aug. 11, 1896. After taking a careful training as engineer, he began manufacturing steam engines at Berlin, and later invented the Lilienthal flying-machine. This invention was one of the most successful made up to 1901, when Santos-Dumont completed a flying-machine and flew successfully around the Eiffel Tower in Paris, France. Though successful in several trips, he was killed on a trial trip near Berlin.

LILIOUKALANI (lē-lē-wō-kä-lä'nē), **Lydia Kamakeha**, queen of Hawaii, born Dec. 2, 1838. She was a sister of King Kalakaua. On Jan. 29, 1891, she was proclaimed queen of the Hawaiian Islands. Though temporarily successful in the government, she aroused opposition by attempting to abolish the constitution and form an absolute monarchy. Soon after, on Jan. 17, 1893, a committee of safety was formed, by which she was deposed, but in 1895 an unsuccessful effort was made to reinstate her. Subsequently she abdicated by resigning her claims to the throne, and took the oath of allegiance to the republic. Her husband, John Dominis, was an American from Boston, and died in 1891.

LILIOUKALANI.

LILLE (lēl), an important commercial and railroad city of France, in the department of Nord, on the Deule River. Julius Cæsar built a castle on its present site, but its founding dates properly from 1007, when Baldwin, count of Flanders, fortified it as a strategic position. It has many beautiful streets and modern municipal facilities, including electric lights, pavements, waterworks, sewerage, and electric street railways. In the city are many fine buildings, among them a medical school, the lyceum, the palace of Richebourg, and numerous educational institutions. The manufactures embrace woolen, cotton, and silk goods, thread, sugar, spirituous liquors, porcelain, oil, and machinery. Its jobbing trade is enormous. Within recent years the city has added materially to its wealth and population, which at present is 202,700.

LILY, an ornamental plant of the genus lilium, characterized by an erect stem from a scaly bulb, numerous narrow sessile leaves,

TIGER LILY.

and one or more large and erect or nodding flowers. In the north temperate zone about fifty species are native, of which five are common to the eastern part of the United States. The white lily is native to the Levant, but has been cultivated extensively in Europe for more than three centuries, and in America from its early settlement. Some of the native varieties of America are very beautiful, among them the wild orange-red lily, southern red lily, Turk's-cap lily, and Carolina lily. Those cultivated most extensively are the white lily, tiger lily, and golden lily. The Turk's-cap is found in marshes, and attains a height of from five to eight feet, bearing orange-colored flowers with black spots. A white lily symbolizes

purity, and has been used in painting in connection with the Virgin Mary. It is mentioned frequently by poets and in oratory. Lilies are cultivated from the seed, by planting the bulblets, and by layers. The process of growing from the seed is slow.

LILY OF THE VALLEY, a genus of plants of the family liliaceæ, native to the bushy places of America and Eurasia. It has oblong leaves, and cup-shaped flowers noted for their agreeable odor. Several

LILY OF THE VALLEY.

species possess medical properties of utility in cases of heart disease. The lily of the valley is a perennial, has slender rootstocks, and the flowers are in a one-sided raceme. It flowers in May.

LIMA (lī′mą), a city in Ohio, county seat of Allen county, centrally located on a number of important railroads. It is surrounded by a productive fruit-growing and farming country, which also produces coal and petroleum. The manufactures embrace machinery, carriages, egg cases, oil products, clothing, furniture, locomotives, and utensils. Many of the streets are beautifully paved, lighted by electricity, and connected by electric car lines. There are also waterworks, sewerage, and several parks. Its school system is thoroughly organized, containing articulated courses of study, and the city has numerous churches and a library. It is the seat of a fine courthouse. Population, 1900, 21,723.

LIMA (lē′mą), an important city and capital of Peru, on the Rimac River, and connected with its port, Callao, and other centers by railways. The city is one of the most beautiful in South America, having a splendid cathedral, government buildings, public schools, and a university. Many modern municipal facilities have come into popular use, including electric lights, sewerage, waterworks, and rapid transit. The manufactures embrace cotton, silk, and woolen goods, clothing, soap, machinery, furniture, sugar, and earthenware. Its domestic and import trade is of growing importance. Pizarro founded the city in 1535. It was partially destroyed by an earthquake in 1746, and in 1881 capitulated to the Chileans. Population, 106,940.

LIME, a small tree of the orange family, native to southeastern Asia, but naturalized in the tropical parts of America, the West Indies, and Europe. It attains to the height of about ten feet, bears a fruit resembling the lemon in appearance and character, but much smaller, and yields a bark of service in making mats and ropes. The wood is light, and valuable in the manufacture of baskets, boxes, and cradles, while the fruit is used principally in the manufacture of beverages and citric acid. The citric acid obtained from the lime is used largely as an anti-scorbutic on long voyages at sea. It is produced in considerable quantities in Cuba and other West Indian islands.

LIME, a white earth-like calcium oxide widely diffused throughout the animal, vegetable, and mineral kingdoms, and utilized from remote ages. In nature it occurs in numerous forms, but is not found in a pure state. It may be produced artificially by calcining a mineral calcium carbonate, as marble, limestone, or seashells, yielding the anhydrous calcium oxide called quick-lime, which with water forms slacked lime. Quick-lime readily absorbs moisture from the air, forming air-slacked lime. The artificial manufacture of lime is conducted on a large scale by burning or calcining different varieties of limestone in a kiln, but the product is not sufficiently pure to be utilized for chemical purposes. Pure lime is a white substance, and is obtained from pure carbonate of lime, such as Iceland spar or Carrara marble. This is effected by heating the pure carbonate, thereby expelling the carbonic acid and obtaining the lime as a residue. There are almost innumerable uses for chemical and commercial lime. The more common uses are for fertilizing; removing hair, fat, and other foreign matters in tanning; to prepare cements and mortars for building; to causticise alkaline liquors in soap-making; to disinfect and destroy noxious insects and vegetable matter, and to purify coal-gas. It is used also for various other manufacturing purposes. Lime is employed largely in medicine, serving as a tonic, as an antacid, and in diarrhœa and stomach complaints.

LIME LIGHT, an artificial light produced by directing an oxyhydrogen flame against pure quick-lime by means of a blowpipe. The light produced in this way is very

intense. It has been utilized as a signal light, for stage service, and in various optical instruments.

LIMERICK (lĭm'ẽr-ĭk), a railroad and manufacturing city of Ireland, situated on the estuary of the Shannon River, and noted for its export and import trade. The manufactures embrace clothing, spirituous liquors, lace, flour, machinery, ironware, leather, and fish-hooks. It is the seat of several large establishments for the manufacture of military clothing. There are good municipal facilities, including sewerage, waterworks, and electric lights. It has extensive docks and wharves, and enjoys a considerable commerce in cereals and live-stock. Population, 37,875.

LIMESTONE, the general term applied to rock composed wholly or in part of calcium carbonate. There are many varieties, differing in composition and structure. They are widely distributed in all the geological systems, but occur most abundantly in the secondary rocks. In a pure state limestone contains about forty-three parts of carbonic acid and fifty-seven parts of lime, but the general intermixture of other minerals is very extensive. When containing magnesium carbonate, it is called magnesian; when clayey, argillaceous; when sandy, siliceous, and when the limestone is crystalline, it is termed marble. Among the principal varieties are compact, foliated, granular, oölitic, calcareous, peastone, and statuary limestone. In many localities the name of the geological system in which it is found is applied to the product, such as Devonian, Silurian, etc. Iceland-spar is a grade of limestone quite transparent and rich in lime.

LIMOGES (lē'mōzh), a railroad and manufacturing city in France, capital of the department in Haute-Vienne, situated on the Vienne River. It contains many beautiful buildings, including a cathedral founded in the 13th century, several government offices, and a number of scientific and educational institutions. There are sewerage, waterworks, public parks, and electric railways. Limoges has excellent railroad and steamboat facilities. The manufacture of artistic porcelain is the most important industry, but there are also manufactures of cotton and woolen goods, shoes, paper, clothing, and machinery. Its export trade to the United States is extensive. Population, 83,860.

LIMPET (lĭm'pĕt), a genus of gasteropod mollusks, more or less widely distributed. They are noted especially for their immense size in the tropical seas. Several well known species occur off the Atlantic coast of America. The limpets commonly adhere firmly to rocks by means of the foot, which acts as a sucker. The shell is conical, and has a more or less prominent apex, the latter turning slightly forward. The food consists of seaweed, which is rasped by the tongue. They are used for bait in fishing, for food, and are also taken as food by birds.

LINCOLN (lĭnk'ŭn), a city in Illinois, county seat of Logan county, twenty-eight miles northeast of Springfield. It is surrounded by a fertile agricultural country, which also contains deposits of coal. The city is the junction of several important railroads, has electric street railways, a public library, and other modern facilities. It has a fine county courthouse and other public buildings. It is the seat of the Odd Fellows' Orphans' Home of Illinois, the state asylum for feeble-minded children, and Lincoln University. The last named institution was founded in 1865. It has a fine library, and is attended by 250 students. There is a considerable trade in cereals, live-stock, and merchandise. Population, 1900, 8,962.

LINCOLN, an important city of Nebraska, in Lancaster county, capital of the state, on the Salt River, fifty miles southwest of Omaha. It is the converging center of a number of important railroads. The surrounding country is fertile, and devoted to agriculture, stock raising, and fruit growing. Among the manufactures are carriages, earthenware, clothing, cigars, canned goods, and machinery. The state capitol is a fine stone structure. It also has a modern county courthouse and a United States government building. Besides its excellent public school system, it is the seat of the Nebraska Military Academy, Union College, University of Nebraska, Nebraska Wesleyan University, Cotner University, Adventist and Episcopalian colleges, and several normal and musical schools. It is also the seat of the state penitentiary and insane asylum. Electric lights and street railways, waterworks, pavements, and several libraries are among the conveniences. Its jobbing trade is of growing importance. Lincoln is the home of William J. Bryan. Population, 1900, 40,169.

LINCOLN, capital of Lincolnshire, England, on the Witham River. It is surrounded by a rich agricultural country, is an important railroad center, and contains many excellent buildings, among them a fine cathedral, numerous other churches, several colleges, and other educational institutions. The site of the city is elevated, commanding a beautiful view of the surrounding region. Its manufactures include flour, machinery, farming implements, clothing, and fabrics. The city has modern facilities, such as telephones, electric lights, and rapid transit. Population, 41,975.

LINCOLN, Abraham, sixteenth president of the United States, born in Hardin county, Kentucky, Feb. 12, 1809; died April 15, 1865. He descended from Samuel Lincoln, who came from England to Massachusetts in the early history of American settlements. His father, Thomas Lincoln, married Nancy Hanks in 1806, and in 1816 removed with his family to Indiana and settled in Spencer

county, not far from the Ohio River, where Abraham grew to manhood. In 1818 his mother died, and the following year his father married Sarah Johnson, under whose careful training his youthful character was formed in the line of prudence and industry. His early education was necessarily limited, but, being studious, he developed remarkable proficiency in the elementary branches and became a studious and scrutinizing reader. His father again emigrated in 1830, settling in Macon county, Illinois, where Abraham, having attained the unusual stature of six feet four inches, joined with his father in clearing the field, building his cabin, and splitting the rails for inclosing the land used for farming purposes. After clearing and fencing the farm, Abraham engaged with a man named Denton Offutt, whom he accompanied to New Orleans on a trading voyage, and later engaged with him as a clerk in a general merchandise store at New Salem. While there, Lincoln read extensively, began the study of surveying and the principles of law, but soon after raised a company to oppose an Indian uprising, being elected captain of a company of volunteers.

ABRAHAM LINCOLN.

The company was mustered out of service after a short time. However, Lincoln reënlisted as a private, and was mustered out in 1832, returning home to make a canvass for the legislature, but was defeated. He next purchased a store, giving his note for the purchase money, but was unfortunate in selecting a partner, on account of which the business venture proved a failure, and he was called upon to pay the indebtedness out of his personal earnings. Soon after leaving the store, he devoted his whole time to the study of law, was appointed deputy county surveyor, and in 1833 became postmaster of New Salem, a position he filled successfully for three years. He served in the legislature from 1834 to 1842, declining further election. In 1837 he formed a law partnership with John C. Stuart at Springfield, and built up a successful practice. He married Mary Todd in 1842, and in 1846 defeated Peter Cartwright, a famous Methodist preacher, for congress, but was not a candidate for reëlection. While in congress he took an active position against the extension of slavery, favored the abolition of slavery in the District of Columbia, but, after retiring, gave little heed to politics, though still favoring the whig party. When the Kansas-Nebraska bill was passed, in 1854, he again undertook active campaign work, and became a leading exponent of the newly formed republican party in the state of Illinois.

In 1855 the whig minority of the state legislature of Illinois supported Lincoln for United States senator, but his democratic opponent, Lyman Trumbull, was elected. His party chose him to oppose Stephen A. Douglas for the senate in 1858, and he immediately challenged his opponent to a joint debate. The debate that followed attracted national attention, but the legislature chosen selected Douglas as senator. He had been mentioned for the vice-presidency in 1856, receiving 110 votes in the national convention, and in 1860 he was nominated for the presidency on the third ballot in the Chicago convention over William H. Seward, who was his principal competitor. In the election that followed the democratic party was divided, and the vote in the electoral college was as follows: Lincoln, 180; Breckinridge, 72; Bell, 39, and Douglas, 12.

Soon after the election of Lincoln to the presidency, a secession movement began in the southern states. This course on the part of the southern people was occasioned largely by a widespread alarm at the aggressive anti-slavery policy proclaimed by many leading republicans. At the time Lincoln was inaugurated, March 4, 1861, seven states had announced their secession, and began to organize resistance to the policy of the administration. Lincoln adopted a conciliatory course, holding steadfast to the union of states, and denying the right of secession claimed by the seceding states. The Confederate government was organized as early as April 4, and on April 13 the Confederates struck the first blow of the Civil War by capturing Fort Sumter. It was a period of intense excitement. The long war that ensued was the most terrible conflict of recent times, the northern states holding steadfast to the union of states, and putting forth every energy to maintain the Union. In the history of the struggle Lincoln is identified with every important phase, giving studious attention to foreign complications, domestic politics, and military and naval movements, as well as routine domestic duties. Profiting by the partial success of Antietam, he issued a preliminary proclamation on Sept. 22, 1862, fixing the coming Jan. 1 as the date of freeing the slaves in the southern states, in the event that the seceded states would not yield, and accordingly the Emancipation Proclamation was issued. His famous eulogy was issued on the battlefield of Gettysburg in 1863.

The republican national convention at Baltimore unanimously renominated Lincoln for the presidency on June 8, 1864, and at the election that followed in November he received 212 electoral votes to twenty-one cast for General McClellan, the seceded states not taking part in the election. He visited Richmond after its fall, and entered

upon a studious investigation of the questions relating to reconstruction. While at a theater in Washington, he was shot by John Wilkes Booth on April 14, 1865, from the effects of which he died the following day. The remains were taken for burial at Oak Ridge, near Springfield, Illinois, amid the most profound sorrow of the nation. The unexpected death of President Lincoln is rightfully regarded the saddest event of American history. Many of his sayings have become proverbial. His sincere devotion to country and his uprightness in every act have rarely been equaled.

LINCOLN, Benjamin, revolutionary general, born in Hingham, Mass., Feb. 3, 1733; died there May 9, 1810. His first official position was that of magistrate, later he held membership in the provincial legislature, and at the beginning of the Revolution became an organizer of troops in Massachusetts, securing the rank of major-general in 1776. In the same year he drove the British vessels from Boston harbor, and soon after reinforced Washington on Long Island, taking part in the battle of White Plains. During the following summer he served with Schuyler against Burgoyne, was severely wounded at the battle of Bemis Heights, and in the following year secured command of the army in the south. Sir Henry Clinton besieged him at Charleston in 1780 with a superior force, and, after being compelled to surrender, he was permitted on parole to return to Massachusetts. In 1781 he was with Washington at the siege of Yorktown, and, when the British forces surrendered, he received the sword of Lord Cornwallis. Under the articles of confederation, in 1781-84, he served as secretary of war. In 1787 he quelled Shay's rebellion in Massachusetts, became lieutenant-governor of that state, and served as collector of the Boston port in 1789-1808, receiving the appointment under Washington.

LINCOLN, Robert Todd, public man, eldest son of Abraham Lincoln, born in Springfield, Illinois, Aug. 1, 1843. He studied at Phillips Exeter Academy, graduated at Harvard University in 1864, and served on the staff of General Grant the latter part of the Civil War. Shortly after the war closed he entered upon a successful law practice in Chicago, where he gave his attention to that profession until 1881, when he became secretary of war under President Garfield. He served till the end of President Arthur's administration, and afterward resumed the law practice in Chicago. President Harrison appointed him minister to England in 1889, a position he held until 1893. In 1897 he became president of the Pullman Palace Car Company.

LINCOLN'S GETTYSBURG ADDRESS, a memorable address made by Abraham Lincoln at the dedication of the Gettysburg cemetery, Nov. 19, 1863. It is rightfully regarded a literary gem. The following is the address in its entirety: "Fourscore and seven years ago our fathers brought forth on this continent a new nation, conceived in liberty and dedicated to the proposition that all men are created equal. Now we are engaged in a great civil war, testing whether that nation, or any nation so conceived and so dedicated, can long endure. We have met on a great battlefield of that war. We are met to dedicate a portion of that field as the final resting place of the men who here gave their lives that the nation might live. It is altogether fitting and proper that we should do this. But in a larger sense we cannot dedicate, we cannot consecrate, we cannot hallow this ground. The brave men, living and dead, who struggled here have consecrated it far above our power to add or detract. The world will but little note, nor long remember what we say here, but it can never forget what they did here. It is for us, the living, rather to be dedicated to the unfinished work which they who fought here have thus far so nobly carried on. It is rather for us to be here dedicated to the great task remaining before us; that from these honored dead we take increased devotion to the cause to which they gave the last full measure of devotion; that we here highly resolve that these dead shall not have died in vain; that the nation shall, under God, have a new birth of freedom, and that government of the people, by the people and for the people shall not perish from the earth."

LIND, Jenny Maria, eminent singer, "The Swedish Nightingale," born in Stockholm, Sweden, Oct. 6, 1820; died near Malvern, England, Nov. 2, 1887. When but three years old she could sing beautifully, was admitted to the court theater singing school at nine years, and about that time began to sing on the stage. She appeared in Weber's "Der Freischutz" at eighteen, and soon became the most popular singer of the Stockholm Royal Theater. In 1841 she took lessons in Paris, but three years later entered for extended study at Berlin, where she learned German and appeared successfully in Meyerbeer's operas. She visited Vienna in 1846 and London in 1847, appearing at the Royal Theater in the latter city. It was at London that she attracted the attention of P. T. Barnum, and, when she came to America in 1850, made a tour under his auspices throughout the United States and Canada, receiving $100,000 as her share of the profits. On

JENNY MARIA LIND.

(Opp. 1022

LINCOLN AND HIS CABINET.

Feb. 5, 1852, she married Otto Goldschmidt, a musician, born in Hamburg, Germany, Aug. 21, 1829, and died in 1890. Subsequently she made successful visits to the leading cities of Europe, appearing for the last time at Düsseldorf in 1870. The family home for the greater portion of the time was at Dresden, but in 1858 they settled in England. Much of the fortune secured by the excellent voice of Jenny Lind was devoted to charitable and philanthropic enterprises. She founded schools in her native land, and gave to charities in Germany and many other European countries. Several gifts were also made to educational enterprises in the United States. She had a pure and elevated mind, deep religious feelings, and was one of the most celebrated singers of modern history.

LINDAU (lĭn'dow), **Paul**, author and critic, born in Magdeburg, Germany, June 3, 1839. He studied at Halle, Leipsic, Berlin, and Paris, and produced numerous plays and novels of merit, many of which have been widely translated. As a literary critic he showed much ability, being talented and searching. Much humor and skill is manifested in his treatment of details. His writings include "Maria and Magdalene;" "North and South;" "American Sketches;" "Dramatical Contributions;" "Travels in Venice;" "Letters from Baireuth," and "The Present."

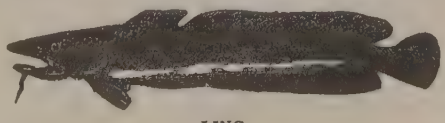
LINDEN, a forest tree commonly called basswood and lime in America, where it is native, but various species are found also in Eurasia and other grand divisions. The trees grow to great heights, frequently from sixty to ninety feet. They yield a rather soft and light wood, and bear sweet-scented flowers, growing in cymes and having the peduncle united to a leaf-like bract. The wood is utilized by carvers and turners, for kindling purposes, and in the manufacture of powder. In nearly all the species the flowers furnish material for a tea, and contain excellent qualities for honey. In many countries the linden is cultivated near apiaries to supply food for bees. There are many varieties, the European and American being quite similar. Linden trees are favorites for gardens and house yards, having widespreading branches when isolated.

LINDSAY (lĭn'zą), a town of Canada, in Victoria county, Ontario. It is connected by several railroads. The surrounding country is farming and lumbering. It has a large trade in flour, cereals, lumber, machinery, and leather. Population, 7,350.

LINEN, a fabric woven from the fibers of flax. Linen textile fabrics include many varieties, such as lawn, damask, cambric, sheeting, toweling, and ducks. The manufacture of this commodity dates from remote antiquity, a fact evidenced by Egyptian monuments and the embalmed dead, found in the tombs, that are wrapped in linen products. Writers generally express the view that the Jews introduced its manufacture into western Asia, and that it spread thence to Europe by way of Greece. It is probable that the Romans introduced the manufacture of linen to the countries of western Europe, since the manufacturing establishments in those parts of the continent have long been important. The linens made in Belgium, Holland, France, Germany, and Britain are especially noteworthy, for the reason that the products are of a very high quality in fineness and also of vast extent. Linen has been manufactured in the United States for many years, but the first extensive mill was built at Fall River, Mass., in 1834, since which time the industry has been gradually developing, though the finer products are still imported quite extensively.

When flax is received at the mill, it has to undergo a line of preparatory operations before being spun into yarn for weaving. It is at first heckled, then prepared for spinning, the latter being done by machinery. After being spun into yarn, the threads are woven into the different kinds of products by machinery, the apparatus depending upon the class of goods desired. However, the machinery does not differ materially from the devices used in the manufacture of cotton. The extensive production of cotton has affected the output of linen fabrics, especially in Europe, but linens have many advantages for various purposes. Linen is much smoother than cotton, has a brighter luster, does not absorb moisture as easily, and is a healthful, clean, and cool material for sheeting and summer clothing. When bleached, starched, and dressed, it furnishes the beautiful material used for collars, shirt-fronts, cuffs, and many other useful articles of apparel. It is stronger than either cotton or yarn, also heavier in weight, and, since machinery can be applied to every phase of its manufacture, it has assumed an important place among the textile fabrics. The common grades of linen are those used for bedding and plain clothing, while the heavy ducks enter into the manufacture of tents, sails, and heavy clothing.

LING, a species of sea-fish found in the northern seas as far north as Iceland. It is allied to the cod family. The body meas-



LING.

ures from three to four feet in length, has grayish sides and back, and the head is flat. The ling is very valuable as an article of commerce. It is caught most abundantly from February to May, and begins to spawn in June. Split from head to tail, and cured in salt brine and dried, it becomes known as stock-fish. An oil is extracted from the liver, which is used as a substitute for cod-liver

oil, and also for lighting purposes in lamps. Among the species are the common ling; the eel-shaped blenny, found off Massachusetts, and the gadoid of Europe.

LINGARD (lĭn'gard), **John,** historian, born in Winchester, England, Feb. 5, 1771; died July 13, 1851. He descended from a prominent Catholic family, studied at the Douai College in France, and in 1794 was ordained priest. Soon after he became professor of philosophy at Crookhall, and was made president of that Catholic institution in 1810. His writings include "Antiquity of the Anglo-Saxon Church" and "History of England." The latter has passed through many editions, was written from a Catholic standpoint, and holds high rank among English histories. His "New Version of the Four Gospels" is still a popular work.

LINNÆUS (lin-nee'ŭs), **Carl von,** eminent botanist, born near Stenbrohult, in the province of Smaland, Sweden, May 24, 1707; died Jan. 10, 1778. He was the son of a country parson, developed an early interest in botany and physiology, and in 1727 began the study of medicine at Lund, but the following year entered for study at Upsala. His university work was interfered with because of his poverty, but by the assistance of Olaf Rudbeck he was enabled to carry forward his study, and also became curator of the botanical garden. In 1732 he secured government aid to make a research of the flora of Sweden and Lapland, and soon after published his "Lapland Flora." Subsequently he studied mineralogy at Fahlun, and in 1835 received a degree from the Harderwyk University in Holland. While in Holland he became associated with eminent scientists, and from time to time announced original discoveries in the study of plants, especially as relating to plant classification. After visiting Germany, France, and England, he became president of the Stockholm Academy, and in 1741 professor of medicine in Upsala, but the following year accepted the professorship of botany. Linnæus is the most eminent naturalist of his time, possessing remarkable accuracy of observation and a philosophic mind. He gave the world an arrangement of plants on a system of sexual relationship, thereby preparing the way for the more modern system of classification now generally approved. His writings include "Natural System;" "Fundamental Botany;" "Genera of Plants;" "Philosophy of Botany," and "Species of Plants." He also wrote an oration in Latin, entitled "On the Necessity of Traveling in One's Own Country," which was published shortly after making a survey of the islands of Gottland and Oland in the Baltic.

LINNET, a singing bird of the finch family, native to North America and the northern portions of Eurasia. It is migratory, about six inches long, and the extended wings measure ten inches. Most linnets are yellowish in color with markings of brownish, but there are red, gray, and brown species. They change color in the different seasons of the year. There are various species that inhabit different parts of the Old World, those found in Egypt coming largely from the Levant to winter. The song is cheerful and lively, and is distinguished by its pleasing notes, making the linnet a favorite cage bird.

LINOLEUM (lĭ-nō'lē-ŭm), an important product derived from linseed oil by the application of chloride of sulphur. It is useful for many purposes, its use depending upon the nature of the process to which the ingredients are subjected in preparation. In a common form it consists of thin sheets, which serve purposes quite similar to india-rubber or gutta-percha. It is also dissolved and used in preparing carpets, table-covers, waterproof coats, etc. In a vulcanized form it serves for handles in cutlery and for mouldings, and in other forms as a cement and for painting both iron and wood works.

LINOTYPE (līn'ō-tīp), a machine for producing stereotyped lines or bars of words as a substitute for typesetting. This machine uses matrices instead of type, each of these responding to the touch of keys, thereby falling into the proper place. When a row of matrices is filled, molten metal is cast to form a solid line of type, after which the matrices are returned by the machine to their proper places by automatic action. The lines or bars containing the words are set up side by side to constitute a column. See **Types.**

LINSEED OIL, an oil expressed from the seed of flax, and which forms the type of the class known as dry oils, from their property of drying into a transparent, tough mass when exposed to the air. It is secured from the linseed either by heating to 200° Fahr. or by pressure without heating, the latter process being regarded the better, as the oil extracted by that method is less liable to chemical decomposition. The raw oil boiled till it loses about one-sixth of its weight becomes of greater value, since it dries up more readily than in the fresh state, and forms a turpentine-like mass scarcely soluble in oils. In that form it constitutes the basis of painters' and printers' varnishes. About twenty-eight per cent of the quantity of seeds pressed is the amount of oil secured, and the residuum constitutes a valuable product for domestic animal food, known as linseed cake. It is sold on the market either in solid cakes or as meal. The principal uses of linseed oil are for mixing paints, preparing varnishes, oil cloth, printers' ink, soft soap, and linoleum, an article used largely for covering floors. Linoleum is prepared by solidifying linseed oil through the agency of chloride of sulphur.

LINTEL (lĭn'tĕl), a piece of timber or stone laid horizontally over a doorway or

window for the purpose of furnishing support to the building.

LION, a majestic carnivorous animal, the largest of the cat genus. It is one of the most active of the large quadrupeds, has a yellow or tawny color, and measures from eight to ten feet in length. At the shoulder the height is about four feet. The tail is nearly four feet long, tufted at the end, and the male has a large, shaggy mane. In all species the lioness is smaller than the lion, but more impetuous and agile, and is destitute of mane. The mane begins to grow at the age of three years, maturity is reached at about six years, and the average life is thought to be about twenty years. Lionesses bring forth from two to four young annually, and the whelps are nourished nearly a year. While the favorite abode is an open plain, during the breeding season they remain secluded, and both parents give much evidence of energy in defending their young.

Like the cat, the lion is disposed to hunt

LION.

its prey most commonly during the night, stealing upon it with great caution, and when at the proper distance it leaps with well directed force and accuracy. The eyes are brilliant, the body muscular, and its remarkable strength has led to the lion being spoken of as the "king of beasts," though its noble appearance and kingly bearing no doubt contribute largely to this appellation. Travelers find it a protection to kindle a fire and keep it steadily burning, as the lion shuns flames, and rather avoids than attacks man unless induced to forceful means by hunger. Formerly lions were common to Eurasia and Africa, but the advent of civilization has caused their retreat to the wild regions of Asia and Africa. The African lions are by far the largest, including a number of varieties. Those found in Asia are medium in size, and some of them do not have a mane. The puma of America is often classed as a lion. If captured young, lions may be domesticated and trained to acts of skill, for which purpose they are frequently exhibited at exhibitions. At the time of the prosperity of Rome many exhibitions consisted of fights between lions and men or other animals, and they were also used for the destruction of Christians and criminals.

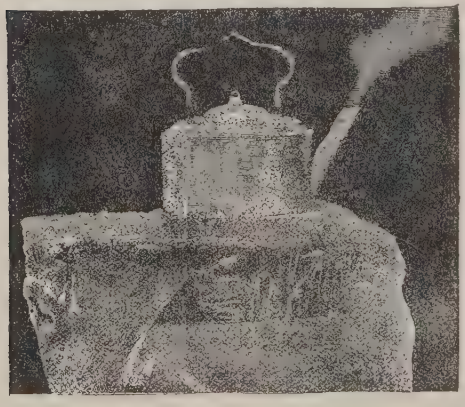
LIPARI (lĭp′ą-rē), an island group also called Æolian. The group includes seventeen islands, lying north of Sicily, but only six are of material size. It belongs to Italy, and contains numerous ancient ruins and volcanic mountains. Earthquakes and storms are frequent. The industries include fishing, mining, and fruit raising, and the principal products pumice stone, soda, sulphur, nitre, fish, wine, and tropical fruits. Among the chief islands are Lipari, Vulcano, Filicuri, Salina, Panaria, and Stromboli, the celebrated intermittent volcano Stromboli being on the last named island. Lipari is the only island of the group inhabited anciently. The entire group has an area of 117 square miles. Population, 18,120.

LIPPI (lĕp′pee), or **Fra Filippo**, celebrated painter, born in Florence, Italy, about 1412; died at Spoleto, Oct. 8, 1469. He studied at Florence, and became famed as a skillful painter of historical and Bible views. His productions include several Madonnas, illustrations of the lives of St. Stephen and John the Baptist, and various frescoes in Florence. His son, Filippino Lippi, was born at Florence in 1460; died there on April 13, 1505. The latter also attained to fame as a painter of religious and historic characters. The most celebrated of his works include "Crucifixion of St. Peter;" "Paul Preaching at Athens," and "Paul Visiting St. Peter in Prison." Many of his frescoes may still be seen in Rome and Florence.

LIQUEUR (lē-kẽr′), an alcoholic cordial sweetened and flavored with aromatic substances for the purpose of making it pleasing to the taste. Various products are used for the purpose, such as cumin and caraway seed in the preparation of kummel; cloves in preparing clove cordial; bitter almonds in making noyau; and aniseed in preparing aniseed cordial.

LIQUID AIR, the term applied to the product obtained by liquefying the so-called permanent gases, such as hydrogen, nitrogen, and oxygen. Though various gases were liquefied fully a century ago, much attention has been directed to the process, particularly because of the invention of new and more powerful apparatus. Faraday attained considerable success in liquefying nitrous oxide and ammonia, but renewed interest was directed to the process in 1898 by Chas. E. Tripler, of New York City, and subsequently by others. To liquefy gases two factors are necessary—pressure and cold. By the application of both these factors to a sufficient extent, any gas, so far as known,

may be liquefied. The point at which liquefaction takes place is called the "critical" temperature, a term applied to both the temperature and the pressure at which a gas liquefies. These differ according to the nature of the gases. For instance, argon liquefies at the critical temperature of —250° Fahr. and the critical pressure of 759 pounds; nitrogen at —295° and 525 pounds, and oxygen at —245° and 762 pounds. Besides Tripler, W. Hampton, of England, and Carl Linde, of Germany, have brought forth practical machines for producing liquid air. While different in many details, they are quite alike in general principles. Among the essential parts is an air compressor, by which air is compressed in a series of cylinders connected by automatic gauges, and the heat resulting from the compression is removed by intercoolers. The construction is such that the last of the series of coolers



LIQUID AIR BOILING ON A BLOCK OF ICE.

is in a large tank filled with running water, which serves to cool the air-pipe, and the air is thence conducted through a separator to free it from moisture. It next passes to the liquefier, a device constructed of small pipe with many turns, which is surrounded by a heavy felt packing to protect it from external heat. When the pressure at the lower end of the coil becomes raised to a sufficient intensity, an expansion valve permits the cool air to pass between and around the coiled pipes.

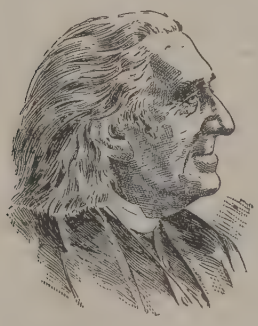
As this operation is continued, it has the effect of gradually cooling the air until the critical point of temperature is reached, when portions of the air liquefy and the product falls into a receptacle, from which it may be taken and used for the purposes intended. There are various uses for liquid air, including its use for refrigeration, for ventilating and cooling rooms, and for divers hygienic purposes. It is used also in surgical operations, in the medical practice, and in the destruction of typhus bacilli and bacteria. Since liquid air has a general temperature of 312° below zero, its usefulness for these purposes can be easily understood. Ice at 30° Fahr. is as hot as a furnace in comparison to liquid air, and when placed on a block of it liquid air boils in a manner quite similar to water affected by a hot fire. This is shown in the accompanying illustration in which the liquid air in the teapot boils, and white frost, congealed from the atmosphere, surrounds all parts of it. Several devices have been patented whereby to utilize it in transporting fruit, fresh meat, and other perishable commodities with perfect safety in the warm season of the year.

LIQUORICE. See **Licorice.**

LISBON (lĭz'bon), the principal seaport and capital of Portugal, situated on the Tagus River, about nine miles from the Atlantic Ocean. Its convenient railroad facilities have given rise to considerable commercial advantages. It has a very beautiful site, an important harbor, good railroad connections, and a number of modern municipal improvements. Among the improvements are gas and electric lights, sewerage, and an extensive system of electric street railways. The harbor is commodious and strongly fortified. A large export and import trade is carried on, especially with the colonies. The manufactures embrace cotton, woolen, and linen goods, jewelry, tobacco, hats, clothing, boots and shoes, machinery, earthenware and utensils. Some of the older streets are tortuous and possess few sanitary facilities, but in the main the city is well regulated, has beautiful parks, gardens, cathedrals, and many excellent educational institutions. The principal buildings embrace a national library, customhouse, arsenal, Church of St. Rogue, Monastery of the Heart of Jesus, and the national theater. Many of the public places are adorned with fountains and statuary. The water supply of the city is secured through an aqueduct eighteen miles in length, which is regarded the most extensive bridge architecture in the world. Lisbon was founded by the Phœnicians, passed to the Romans, then to the Goths, later to the Moors, and in 1146 was captured by Alfonso I. It became the capital of Portugal in 1422, and has been associated with various historic events since then. In 1755 one of the greatest earthquakes on record visited the city, in which 35,000 persons were killed. Population, 308,572.

LISZT (list), **Franz**, pianist and composer, born in Raiding, Hungary, Oct. 22, 1811; died in Baireuth, Oct. 31, 1886. He undertook the study of music at the early age of six years, at nine attracted much attention by his skill on the pianoforte, and soon after secured means from several noblemen to study at Vienna a period of six years. In 1823 he began additional study at Paris, and two years later composed his first work, entitled "Don Sanche." Beginning in 1839, he traveled through various countries of

Europe, everywhere exciting applause and admiration, and in 1848 became director of the court theater at Weimar, Germany. While there he met with enthusiastic reception, and introduced the music of such writers as Berloiz, Wagner, and Schumann. Richard Wagner married his daughter, while Hans von Bulow was among his pupils on the pianoforte. In 1865 he was ordained a Catholic priest, and after 1871 resided principally in Pesth. Among the distinguished honors shown him was the decoration of the cross of the Legion of Honor, and in 1861 he was made commander in that organization. Liszt was not only an excellent musician, but an author, and was noted for his generosity and extensive influence over the younger musicians of his time. His principal works include two concertos, fifteen symphonies, and a number of oratorios. He also published "Life of Chopin" and "Gypsies and their Music." Among his chief musical works are "Christ;" "Faust's Symphonie;" "Holy Elizabeth," and "Coronation Mass."



FRANZ LISZT.

LITCHFIELD (lĭch'fēld), a city of Montgomery county, Illinois, forty-two miles south of Springfield, on a number of important railroads. It has a fine school system, electric lights, waterworks, and a public library. Among the manufactures are threshing machines, earthenware, carriages, flour, and brooms. The surrounding country is agricultural and dairying. It also has valuable deposits of coal, natural gas, and mineral oil. Population, 1900, 5,918.

LITERATURE (lĭt'ēr-à-'tūr), collectively, the written or printed productions of the human mind, embracing the entire results of knowledge and fancy, especially such productions as are marked by vigor and elevation of thought. In the stricter and narrower sense literature belongs to the fine arts, and embodies thought that is power-giving, or inspiring and elevating, rather than merely knowledge-giving. In this sense it excludes the writings that are merely technical or for a particular class; and embraces those that are of interest to man in an æsthetic sense, that are characterized by an elevated tone and style, and shaped by the creative imagination or power of artistic construction. Literature may be divided into three classes —representative discourse, oratory, and poetry. Representative discourse embraces all the productions in which the writings are for the sake of the theme itself; oratory, where the representation is for the sake of the effect on another mind; and poetry, where it embodies in beautiful form the thoughts presented, largely for the sake of the form. Dean Stanley embraces in literature all those great works that tower above professional or commonplace uses, and take possession of the mind of a whole nation or a whole age. The literature of the principal peoples is treated in the articles prepared especially in relation to the different countries, such as Greece, France, Germany, England, etc., which see. See **American Literature.**

LITHARGE (lĭth'ărj), the general name of lead monoxide made by moderately heating metallic lead in a current of air. It has a straw-yellow or reddish color, and is used as a pigment, in making flint glass and for glazing pottery.

LITHOGRAPHY (lĭ-thŏg'rà-fy), the art of producing printed matter from a flat lithographic stone on which an engraving or drawing has been made. The art was introduced by Alois Senefelder (1771-1834) at Munich about 1796, and the best lithographic stone is still produced in Germany. This class of stone is almost the only one suitable for lithographic work, being a variety of fine limestone and having a light-cream or gray color. It is formed into plates according to the size wanted, usually several feet square, and may be split easily into sheets of uniform thickness. The artist prepares the surface of the design to be printed from in various ways; among them, by engraving it on a prepared stone; drawing it with a watery-ink, or with a solid crayon; and by transferring from an inky design on paper by various means. The usual process is to cover the prepared stone with a greasy substance. This penetrates the stone, and can be removed only by cutting into it as deeply as the greasy substance has entered. The design is prepared by cutting in this manner, then filling with water the portions not covered by grease, after which an inky roller is passed over the stone with the effect that ink adheres to the greased parts, but is repelled by the portions moistened with water. In pressing the paper against the surface of the stone the inky surface transfers an impression of the design drawn by the artist.

Boiled linseed oil is used commonly in preparing the greasy surface for lithographic work, and split diamonds are employed for preparing the script and finer lines, though these are placed on after the heavier designs have been engraved. The delicate tints and shades are made by fine parallel lines, numbering from seventy-five to one hundred to the inch. Products similar to those secured by lithographing are obtained from zinc plates, when the process is called zincography. It possesses the advantage that plates prepared of zinc are less liable to breakage and are more easily portable than stone. Chromolithography embraces products containing

more than one color or tint, which are prepared from separate stones, there being as many different stones as tints desired, the number varying all the way from two to thirty. By photo-lithography is meant a process in which a photographic negative is transferred to the stone plate. This process is utilized in producing maps, plans, outlines, and various other matters.

Within recent years attempts have been made to utilize aluminum in lithography in place of the ordinary lithographic stone. It possesses the advantage of being lighter, takes drawings without much resistance, and after being used it may be melted and made to serve again by re-rolling. The lithographic stone has been imported more or less by all countries from Solenhofen, Bavaria, on account of which the price has been quite high, thus supplying another reason why zinc or aluminum has been used to a growing extent. The United States is becoming a large producer of lithographic stone. It is found in Utah, Tennessee, Kentucky, and several other states, the production in Utah being the most important.

LITHUANIA (lĭth-ū-ā′nĭ-ą), a region of Europe now included in western Russia and northeastern Germany. In the 11th century it constituted a grand duchy; in the 14th century it was annexed to Poland, and in 1772 the first dismemberment of Poland transferred Lithuania to its present dependency. Its entire area is about 100,000 square miles, of which all but 6,750 square miles belongs to Russia, and the latter portion to Germany, being a part of the kingdom of Prussia. The Lithuanians are classed with the Indo-Europeans. They are of a peaceable disposition, have fair features, blue eyes, light skin, and engage principally in agriculture and stock raising. In religion they are largely Greek and Roman Catholic. They are noted for their liberal support of schools and educational arts. In the beginning of the last century they began to acquire land titles, and now own many fine stock, cereal, and dairying farms. The language spoken is related to the Old Prussian or Lettic. They possess a literature containing many excellent religious works, some important history, and numerous popular songs and hymns. It is also rich in legends and folklore. The legends are especially rich with primitive tales and fables. The entire Lithuanian race is estimated at 2,750,000, of whom about one-half speak the Lithuanian language.

LITMUS (lĭt′mŭs), a vegetable color obtained from several species of lichen, and used in chemistry to test the presence of acids and alkalies. Acid changes the blue color of litmus to red, and the red color is again changed to blue on being mixed with an alkali.

LITTLE CROW, a Sioux Indian chief, born near St. Paul, Minnesota. He first attracted attention in 1862 by inciting an Indian outbreak. The Indian uprising extended along the Upper Minnesota River, where about 1,000 men, women, and children were slain. Gen. William H. Sibley met the Indian forces at Wood Lake on Sept. 23, 1862, and after defeating them took 2,000 prisoners. Forty of the leaders were hanged; the others were removed to the Missouri River, but Little Crow escaped. In 1863 he led a raiding expedition and was shot near Hutchinson, Minnesota. The Minnesota Historical Society has his scalp among its collections.

LITTLE FALLS, county seat of Morrison county, Minnesota, on the Mississippi River, about ninety-five miles above Minneapolis. It has good railroad connections. The Mississippi River supplies an abundance of water power. It has good schools and excellent municipal facilities. The surrounding country is farming and stock-producing. Its manufactures include flour, paper, machinery, and lumber products. Population, 1900, 5,774.

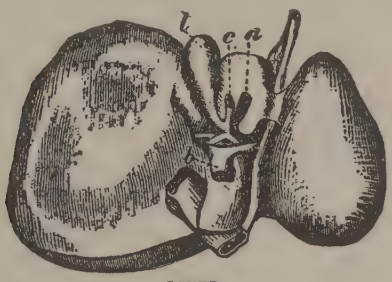
LITTLE FALLS, a city of New York, in Herkimer county, on the Mohawk River, and surrounded by a productive farming and dairying country. It has modern municipal facilities, fine railroad connections, and is an important educational and manufacturing center. The products embrace flour, woolen goods, bicycles, hardware, and machinery. There is a large trade in farm produce and merchandise. Population, 1900, 10,381.

LITTLE ROCK, an important city and the capital of Arkansas, in Pulaski county, about 120 miles southwest of Memphis, Tennessee. It is located on the Arkansas River and a number of important railroads. The city has a fine system of electric lights and street railways, good schools, a public library of 90,000 volumes, and well paved streets. It is the capital of the county, and seat of a United States court. The principal buildings include the state capitol, Philander Smith College, Arkansas Female College, a Roman Catholic academy, and the Cathedral of St. Andrew. Granite quarries are within its vicinity, and the surrounding country is fertile, producing cereals and fruits. Among the manufactures are cotton and woolen goods, furniture, cotton-seed oil, ironware, clothing, wagons, and machinery. The river is navigable for large steamers. It is crossed at the city by a fine drawbridge. Population, 1900, 38,307.

LITTLE TURTLE, a Miami Indian chief, remarkable for intellectual strength and skill in war. On Oct. 22, 1790, he commanded an Indian force that defeated General Harmar on the Miami, and on Nov. 4, 1790, gained a victory over General St. Clair at St. Mary's. He concluded peace with the whites in 1795 by signing the treaty of Greenville, by which large tracts of land in Ohio were opened for settlement. In 1797 he met President Washington and several other high officials at Philadelphia. His death

occurred July 14, 1812, at Fort Wayne, Indiana.

LIVER, a large glandular organ situated in the upper abdominal cavity of vertebrates, whose function is to secrete bile,



LIVER.

elaborate and store up glycogen, and otherwise change the blood that passes through it. The liver is the largest organ in the human body. It is situated on the right side below the diaphragm, and weighs about four pounds. Its general form is broad, flat, thin at the left side, and thick toward the right. It has an arched upper surface, but the lower surface is irregular, divided into five lobes, and its tubes contain nearly one-fourth the blood of the body. Arterial blood is brought to the liver by the hepatic artery *a*, directly from the aorta, while the portal vein *b* conveys to it venous blood from the stomach, intestines, pancreas, and spleen. The bile, a substance necessary to life in the digestion of food, is a dark-golden colored liquid of bitter taste, and when not needed for digestion is stored in the gall cyst *l*, with which the bile duct *c* communicates. About three pounds of bile are secreted per day. The diseases of the liver include hepatitis; inflammation of various forms; jaundice; and cirrhosis; the last named is often called gin-drinkers. Diseases of the liver are accompanied by a yellowish complexion of the skin, owing to imperfect or inadequate bile secretion. The lower animals apparently have no liver, but rudiments of a similar organ appear in forms quite low in the scale of life. All vertebrates, except the lancelet, have a well defined liver, and this organ also is found in many of the invertebrate animals. As we ascend the scale of animal life the liver assumes perfect form with much rapidity, and in the higher vertebrates it is very similar to the liver of man.

LIVERMORE, Mary Ashton Rice, authoress and lecturer, daughter of Timothy Rice, born in Boston, Mass., Dec. 19, 1821. She studied at the Young Ladies' Seminary of Charlestown, taught school at Duxbury, and married D. P. Livermore, a Universalist minister. In 1862 she became an agent of the United States Sanitary Commission, traveling through various parts of the country, visiting hospitals and sanitary societies, and in 1863 aided in organizing the Northwestern Sanitary Fair in Chicago. Subsequently she lectured on temperance and other reforms, advocated woman suffrage, and in 1870-71 edited the "Woman's Journal." Her writings include "Thirty Years Too Late;" "Pen Pictures," and "My Story of the War."

LIVERPOOL (lĭv'ẹr-pōōl), the most important seaport in Great Britain, situated on the Mersey River, three miles from the Irish Sea, in Lancashire, England. Next to London, it is the largest and wealthiest city of England. It has important railroad connections, uniting it with all the trade emporiums of England and Scotland. The city is supplied with all modern municipal facilities, including telephones, gas and electric lights, sewerage, pavements, public parks, and electric street railways. Its wharves and docks are commodious and extensive, and are crowded with vessels that communicate with all parts of the world. Liverpool has many fine streets, mostly platted at right angles, and kept remarkably clean in the better residence portions. In several parts of the city are elevated railways. Among its principal buildings are included several fine public schools, numerous churches, and a number of important colleges and seminaries. The institutions of higher learning include the Liverpool College, Queen's College, Liverpool Institute, and University College; the last named has sixty professors and 750 students. There are also business colleges and schools of law, art, medicine, engineering, and charitable and benevolent societies. The places of worship number 375, representing all principal religious organizations, and embracing among other excellent buildings a number of splendid cathedrals, churches, and synagogues. It also has many fine monuments, statues, boulevards, and central railway stations. Among the manufactures are cotton and woolen goods, spirituous liquors, cordage, ironware, sugar, clothing, chemicals, steam-ships, tobacco, and machinery. It is noted as the principal port for the departure of emigrants from Britain. The export and import trade is very extensive, and embraces all classes of products produced and consumed in the United Kingdom.

The city of Liverpool was founded in 1190. At the middle of the 14th century it had a population of 840, but in 1561 it had declined to only 690. In 1647 it was made a free port, from which time its prosperity dates, being stimulated especially by its large trade in cotton. Docks were not built until 1700. Since then the dock capacity has been enlarged until at present these improvements include a large area of water surface. The more recent improvements of value in promoting growth include the construction of a railway tunnel, in 1885, under the Mersey, by which connection is formed with Berkenshire; the opening of a ship canal to Manchester, in 1894; and the construction

of an overhead railway in the same year. Politically Liverpool is strongly conservative and sends nine members to parliament. Population, 684,590.

LIVINGSTON, Philip, American patriot, born in Albany, New York, Jan. 15, 1716; died June 12, 1778. He graduated at Yale College, entered a mercantile business in New York, and served as a member of the provincial assembly in 1758-69. In 1774 he was a delegate to the continental congress, and as such was a signer of the Declaration of Independence. He gave much support to philanthropic projects and sold part of his property to sustain public credit during the Revolution.

LIVINGSTONE (lĭv'ing-stŏn), **David,** missionary and explorer, born near Glasgow, Scotland, March 19, 1813; died at Ilala, Africa, May 1, 1873. He was the son of Neil Livingstone, a man of humble family, and when David was ten years of age he left the village school and engaged as a laborer in a cotton mill. His natural fondness for study caused him to devote all his leisure time to reading; later he attended a night school, and at the age of twenty-three was qualified to undertake a college course. After attending classes in medicine and Greek at Anderson's College, he studied theology, and in 1838 was accepted by the London Missionary Society as a missionary to Africa. On Nov. 20, 1840, he sailed for Africa, and on July 31 of the following year joined the settlement made by Robert Moffat in South Africa. His field of labor for the first nine years was in the Bechuana territory in connection with Robert Moffat, and while there married Mary Moffat, daughter of the latter. His desire to penetrate and operate in the Transvaal Republic was opposed by the Boers, and he next proceeded northward, where he discovered Lake Ngami and the fertile regions, traversed by numerous streams, that lie near the lake.

In the spring of 1852 Livingstone entered upon a great exploring expedition for the purpose of visiting many regions lying between the Indian and Atlantic oceans, an enterprise which he completed in four years. Shortly after he resigned as missionary and returned to England, where he wrote his "Missionary Travels in South Africa," published in 1857. While on this visit home he also came in contact with various prominent statesmen and educators, many of whom gave him encouragement, which soon after led to his appointment by Queen Victoria on a commission to explore the basin of the Zambezi. He reached the mouth of the Zambezi on May 14, 1858, and not only explored the river and its tributaries, but also discovered Lake Nyassa. On July 23, 1864, he returned to England, and while there published his second work, entitled "Zambezi and its Tributaries." In this work he called attention to the evils of the Central African slave trade, and various matters of interest regarding the resources of the country, with the design of securing better equipments for a tour of exploration. Accordingly he was fitted out by the Royal Geographical Society with the special view of settling disputes regarding the sources of the Nile. His tour from Zanzibar was begun on March 19, 1866. After penetrating westward and thence northward, he reached the vicinity of Nyassa and Tanganyika, discovering the Lakes Bangweolo and Moero, and also the sources of the Congo, thus disposing of a dispute that had perplexed geographers for many years. Communications regarding his welfare were not received for three years, but Henry M. Stanley, a correspondent sent by the "New York Herald" to find Livingstone, published a report by which all fear was allayed. The two parted in 1872, and Livingstone remained to explore the southern regions of Tanganyika, but died the following year. The remains were brought to England on April 18, 1874, and buried at Westminster Abbey.

LIVY (lĭv'ĭ), **Titus Livius,** Roman historian, born in Padua, Italy, in 59 B. C.; died in 17 A. D. He was favored by an early

LIZARD.

training that made him a skillful rhetorician, and at middle life began his celebrated history. This great work included 142 books, but only thirty-five are extant. There are tables of contents of all the lost books except two in existence, from which many material facts have come to light. The history as given in the first ten books treats of the period from the foundation of Rome, in 753 B. C., to 292 B. C., and gives a record of the Second Punic War. A history of the city, embracing the period from 219 B. C. to 201 B. C., is given in the volumes included from the twenty-first to the forty-fifth, and other books bring the history down to the year 167 B. C. The historical writings of Livy are perfect from the standpoint of construction, rather than as an exhibit of facts. It was his purpose to portray elaborately historic events for the purpose of glorifying his country rather than to spend time investi-

gating facts and giving an authentic and reliable record.

LIZARD (lĭz'ẽrd), the popular name of an order of reptiles having four well developed limbs, each terminated by five toes of unequal length, and an elongated body. There are many species, the entire list embracing about 1,500. Fifteen genera have been described. They frequent regions from the equator to high latitudes in the temperate zones. In the tropical regions they are the most numerous and also attain the largest size. The size varies from a few inches to three or four feet. Some species are carnivorous in habit and feed on insects, small quadrupeds, and birds, but others live wholly by feeding on plants. The tail is long and powerful in most varieties, and this organ, like the legs, is reproduced in case it is lost. They propagate by laying eggs, which are hatched without care of the parents, and the color is very various, most species having bright markings. A species of lizard native to Mexico and Arizona is poisonous, the poison being connected with a grooved tooth, but all others are devoid of poison glands. The different families of the order embrace the iguanas, chameleons, skinks, and geckos. In the winter-time and during cold weather they are in a torpid state, but manifest much activity during the season of warmth.

LLAMA (lä'mȧ), a ruminating quadruped closely allied to the camel, and native to the southern parts of Peru and other sections of

LLAMA.

South America. Writers usually classify the llama, alpaca, vicuna, and guanaco as allied species, the former two being domesticated largely and the latter living mostly in a wild state. The llama is noted for its faithfulness in carrying commodities on its back and because of its ability to forage for its support, on account of which it is utilized in Peru and Chile as a beast of burden. The height is about three feet at the shoulder, and the color diversified, but often whitish or blackish. It has ability to travel about fourteen miles a day with a hundred-weight across mountain districts. The hair is used in the manufacture of coarse material, and the flesh of young animals is valued for table use. Considerable herds of llamas still frequent the plains of Patagonia and various places in the Andes Mountains, where they are hunted.

LLANOS (lä'nōs), the name applied by the Spanish to the level plains in the northern part of South America. They are situated principally in the basin of the Orinoco and in Colombia. In many places they are quite barren, but in some localities are good pasture and timbered areas. Similar plains are known as pampas in the southern part, and as savannas in North America.

LLOYD'S (loidz), a vast corporation of London, having offices in the London Royal Exchange, and so named because the early members met in a coffee house conducted in the 17th century by Edward Lloyd. The business of the corporation is to write insurance, collect and publish information in relation to commerce, and also furnish a library, restaurant, and suitable quarters for ship auctions. Membership is solicited with the understanding that those joining give security to discharge liabilities, and the general affairs are under the direction of a committee. The marine and general insurance carried by the company amounts on an average to about $2,250,000,000. Among the publications are the daily "Lloyd's List," the annual "Lloyd's Register of Foreign Shipping," and several other periodicals.

LOADSTONE (lōd'stōn), or **Magnetic Iron Ore**, a mineral remarkable for its high magnetic quality. It consists of protoxide of iron mixed with peroxide of iron, and is found in primitive rocks, but sometimes in grains. Its highly magnetic property caused the ancients to believe that it possesses a magical or divine effect, until the phenomena of magnetism became better understood. See Magnet.

LOAM, a mixture of various earths, but consisting principally of sand and clay, the latter predominating. With loam formations occur deposits of decayed animal and vegetable matter. Upon the proportion of the latter depends in a large measure the fertility of the soil.

LOANDA (lō-ăn'dä), **St. Paul de**, a town of Angolia, a Portuguese possession of western Africa, and noted as a trading center. It is the seat of several important public buildings, and contains a number of churches, a governor's residence, and a bishop's palace. The harbor is shallow, making it impossible for the larger vessels to reach nearer than one and a half miles from shore. There are several improved streets, modern municipal facilities, and railroad connections with interior points. The population is about 12,000, of which about one-third are Europeans.

LOBANOFF - ROSTOFSKY, Prince,

statesman and diplomat, born in Rastoff, Russia, Dec. 30, 1834; died at Scheptowka Station, Austria, Aug. 30, 1896. He descended from a leading family, secured a good education, and in 1854 entered the Russian diplomatic service. In 1878 he became ambassador to Constantinople, was transferred to London the following year, and in 1882 was made ambassador to Vienna, where he remained thirteen years. His service at these important courts was highly efficient, and in 1895 he was made minister of foreign affairs. In that position he rendered valuable services in effecting a peace treaty between Servia and Bulgaria.

LOBELIA (lō-bē'lĭ-ȧ), a genus of herbs, including many species widely distributed in various parts of the earth, but especially abundant in the tropical regions of America. They contain a milky juice, have alternate leaves, and produce many-seeded pods. The flowers and foliage are very beautiful, and several species possess medicinal properties useful for an expectorant and cathartic. As a medicine it is prescribed in various doses for spasmodic asthma and as a diuretic. When handled in a dry state the herb irritates the throat and nostrils like tobacco. The medicinal preparations are known as the tincture and the ethereal tincture of lobelia.

LOBSTER, a large marine crustacean somewhat resembling a crawfish, but larger in form. The common lobster of America

LOBSTER.

is a typical species. It is ten-footed, has a long tail, is stalk-eyed, and often attains a weight of ten pounds. It is widely distributed in America, occurring in large numbers off the New England and New York coasts, but also in other waters of America and Eurasia. The first pair of legs are much enlarged and form the claws. Lobsters mostly frequent rocky coasts, feed on other animals, and have a bluish or greenish colored shell, which becomes red by boiling. The tail spreads like a fan, is constituted of a number of flat plates, and serves in propelling the animal through the water. The young are able to swim with much rapidity, but the adults walk or crawl, and the molting occurs annually in adults. They are caught in baited traps for the market, and are considered excellent food, the principal edible parts being the tail and claws. The season for catching is from the early part of October till May.

LOCAL OPTION, a term used in civics to express the right of determining certain measures of government by popular vote in each locality of a state, such as a county, township, or city. The term has come into extensive use in the United States in relation to the liquor traffic, and is applied to the system whereby each community may decide by vote whether or not the traffic may be licensed and maintained. In some states the local option is by petition, but it is exercised more commonly by an election.

LOCH LEVEN (lŏk lĕv'ẹn), a lake in southeastern Scotland, twenty-three miles northwest of Edinburgh. It has an area of 3,410 acres, is surrounded by prominent elevations, and drains to the Firth of Forth by the Leven. The lake has fine trout-fisheries and several islands, the most important of the latter being Castle Island and St. Serf's Inch. Mary Queen of Scots was imprisoned for ten months on one of these islands in 1567-68, and on July 4, 1567, signed her abdication.

LOCH LOMOND (lō'mọnd), a beautiful lake of Scotland, situated in the counties of Dumbarton and Stirling. It is surrounded by beautiful hills, has a number of wooded islands, and is noted for its excellent scenery. The length is about twenty-two miles and breadth from one to five miles. In its vicinity are several noted caves. Fifteen miles southeast of Loch Lomond is the city of Glasgow.

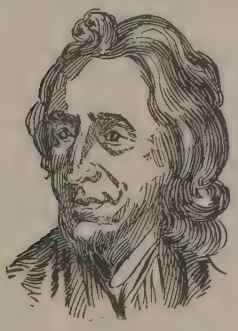
LOCK, an inclosure in a canal where boats are raised and lowered for the purpose of passing them from one level to another. It consists of a basin between the levels, having a pair of gates at each end communicating with the respective levels. In descending from a higher to a lower level the water is allowed to flood the lock until it reaches a common level with the water in which the vessel is located; and after the vessel enters, the lower gate is opened, whereby the vessel is lowered to a level corresponding to the surface of the next lower lock, and again moves forward. This operation is continued until the vessel is brought to the common level of the canal. When the boat is to attain a higher elevation, a process directly opposite is pursued. It would be quite impossible to build canals in many regions if it were not that a system of locks could be utilized.

LOCK, a fastening having a bolt moved by a key, and used to secure a door, lid, or other object against intrusion. There are many different classes of locks, and some of them date from the time of the Egyptians and Babylonians. For many years it was a matter of deep study to find how to construct a lock that no one could open unless he had a proper key. The first lock of this character was known as a combination lock and could be opened only by the proper key, after turning a knob on the outside for the purpose of placing the interior bolt in such a position

that the key could be made to turn effectually. In 1820 an American inventor, Linus B. Yale, patented a lock that is combined with a clock mechanism, and by means of it the combination locks are so constructed that they can be opened only at a specified time. The time locks and Yale locks with special keys are the ones used most extensively where large treasures and valuables are stored.

LOCKE, David Ross, humorist, better known as Petroleum V. Nasby, born in Vestal, New York, April 20, 1833; died in Toledo, Ohio, Feb. 15, 1888. He learned the trade of a printer at an early age, was connected with several periodicals in Ohio, and in 1860 became editor of the "Findlay Jeffersonian," in which he published various articles over his pseudonym. In 1865 he purchased the "Toledo Blade," and made it highly popular by satirizing President Johnson in his reconstruction policy. He became editor of the "New York Evening Mail" in 1877, but a few years later returned to Ohio. His publications include "Swingin' Round the Circle;" "Opinions and Prophecies of Yours Truly," and "Nasby in Exile."

LOCKE, John, author and philosopher, born in Somersetshire, England, Aug. 29, 1632; died Oct. 28, 1704. He studied at Westminster School, entered Oxford in 1661, and in 1664 became secretary to the British envoy at Berlin. Soon after he returned to Oxford to receive his degree, and afterward took a course in medicine, but subsequently became devoted principally to philosophy. Lord Shaftesbury selected him as secretary in 1672, in which capacity he drew up a constitution for the province of Carolina, but this was rejected on account of liberality in religious affairs. When the earl of Shaftesbury left England as an exile in 1682, Locke accompanied him to Holland, where he studied and investigated various philosophic questions, returned to England five years later, and there finished his celebrated work, "Essay on the Human Understanding," which he had begun seventeen years before. After the revolution he obtained the position of commissioner of appeals at a salary of $1,000 a year, in which he maintained the principles of reform by an active interest in the cause of liberality. King William appointed him commissioner of trade and plantation in 1695, but on account of feeble health he soon after resigned and made his home with Sir Francis Masham, at Oates, in Essex, where he died.



JOHN LOCKE.

The writings of Locke had a marked influence upon the thought of his time, many of them being widely translated and studied in various countries. In his work on psychology he opposes the theory of an innate idea, and assumes that the mind may be likened to a blank page on which ideas are written by experience; sensation and reflection being the sources of all our ideas. His principal writings, besides the one named above, include "Method of a Commonplace Book;" "Letters on Toleration;" "Treatises on Government;" "Reasonableness of Christianity;" "Conduct of the Understanding," and "Notes upon St. Paul's Epistles."

LOCK HAVEN, a city in Pennsylvania, county seat of Clinton county, on the Susquehanna River, twenty-eight miles above Williamsport. It has a fine county courthouse, is well connected by railways, and manufactures machinery, cigars, paper, leather, and earthenware. The surrounding country is rich in mineral and farm products. Pavements, electric lights, rapid transit, and waterworks are among the improvements. Population, 1900, 7,210.

LOCKPORT, a city of New York, in Niagara county, twenty miles east of Niagara Falls. It is the focus of several railways, connecting it with other trade centers, and is noted for its commercial enterprise. The manufactures embrace woolen goods, paper, ironware, flour, machinery, engines, furniture, brooms, and carriages. There are excellent schools, fine churches, electric railways and lights, and a public library. In its vicinity are productive limestone and sandstone quarries. Population, 1900, 16,581.

LOCKWOOD, Belva Ann Bennett, reformer and lawyer, born in Royalton, New York, Oct. 24, 1830. She began teaching a district school at the age of fifteen, married Uriah H. McNall in 1848, but was left a widow in 1853. In 1857 she graduated at Syracuse University and studied law at Washington, D. C. She married Ezekiel Lockwood in 1868, and was admitted to the bar in 1873. The equal rights party recognized her ability as a public speaker in nominating her for the presidency of the United States in 1884.

LOCOMOTIVE (lō'kō-mō-tĭv). See **Steam Engine.**

LOCUST (lō'kŭst), a genus of trees native to North America, known also as acacia. The trees have a rough bark, pinnate leaves, fragrant white flowers, and grow to a height of eighty feet. The wood is pierced extensively by borers, but when manufactured it is serviceable in fencing, for furniture, machinery, railway sleepers, and in the construction of houses. The honey-locust has pink flowers, which have a fine fragrance and grow in clusters. There are several species closely allied, but differing somewhat in minor points. The common honey-locust is planted largely as an ornamental tree and

also for hedges, being capable of bearing trimming and dwarfing.

LOCUST, the name of several species of insects allied to grasshoppers and crickets. The term is applied conjointly by some writers with the name grasshopper to destructive and migratory species of insects common to many portions of the continents.

LOCUST.

However, the true locust is a distinct kind of orthopterous insect. There are two particularly destructive species of these insects in America; one is found in the northeastern part of the United States and Canada, which is more properly the locust, and the other in the regions west of the Mississippi. Those common to the latter region have been especially destructive in parts of Texas, Colorado, Kansas, Nebraska, and Oklahoma at different times, but in recent years they have been less abundant. Species very similar have been known to swarm in vast numbers in various countries of Asia and Africa, darkening the sunlight in their flight. They devour all forms of vegetation. When most abundant in the Mississippi valley, they settled down in some regions in such vast numbers that they destroyed all vegetable growth. In some places they accumulated so thickly upon the railways that it interfered with traffic.

The common locust has great leaping power because of its powerful hind legs, which are stronger than those of grasshoppers. They fly with a loud whizzing sound. The eggs are deposited in the earth by the females in the fall of the year, and when warmth returns the following spring the young are hatched. The Carolina locust is pale yellowish-brown, has black wings, and is about one and a half inches long, the extended wings measuring three inches. They fly a considerable distance when disturbed by a traveler. The greatest danger to crops is while they are in an immature state, for soon after they take to wing and distribute in swarms. They also effect much damage and cause disastrous famines in the regions were they settle. The Arabs and some other nations use the locusts as an article of food. They are prepared for the table by pounding them into small particles and baking them as bread or frying them as a delicacy in oil. In the island of Cyprus, India, China, and some of the American states preventative measures have been adopted by pulling large tanks of diluted kerosene across the ground. This serves to kill them by the thousands. Another method is to dig pits, lining them with zinc, and after the locusts fall in they are destroyed by fire or in some other way.

LOCY, William A., zoölogist, born in Detroit, Michigan, Sept. 14, 1857. He graduated at the University of Michigan, subsequently studied at Harvard, and in 1887 became professor of biology in Lake Forest College. In 1891 he was chosen professor of physiology at Rush Medical School, by whose authority he was sent to inspect the University of Berlin, and while in Europe purchased valuable apparatus. He became teacher of zoölogy at the Northwestern University, Evanston, in 1896. His writings include "Derivation of the Pineal Eye;" "Primary Segmentation of the Vertebrate Brain," and "Teaching Zoölogy to College Classes."

LODGE, Henry Cabot, author and statesman, born in Boston, Mass., May 12, 1850. In 1871 he graduated from Harvard University, studied law, and in 1876-79 was lecturer on American history in that institution. He edited the "North American Review" in 1873-76, and the "International Review" in 1879-81. After serving in the state legislature, he was elected to congress as a republican in 1886, serving till 1892, and in 1893 became United States senator, to which position he was reëlected in 1899. Not only has he proved an able legislator, but a prolific writer. His writings include "Life of Alexander Hamilton;" "Studies in History;" "Hero Tales from American History;" "Life and Letters of George Cabot;" "Life of Daniel Webster," and "Short Stories of English Colonies in America."

LODI (lō′dī), a city of Italy, in the province of Milan, on the Adda River, nineteen miles southeast of Milan. It is connected by railway, has a Gothic cathedral erected in the 12th century, and contains important manufactures of silk and woolen goods, chemicals, and machinery. The old city of Lodi, situated about five miles west, is noted as the place where Napoleon forced the bridge on May 16, 1796, in spite of vigorous firing by the Austrian army. Population, 27,820.

LODZ (lōdz), an important city of Russia, situated in the Polish government of Piotrków, seventy-five miles southwest of Warsaw. It is noted as a railroad and educational center, has electric lights and street railways, substantial pavements, public libraries, and a number of parks. The manufactures embrace cotton and woolen goods, machinery, earthenware, utensils, and vehicles. Large quantities of cereals and fruits are produced in the vicinity. The population is principally German. The city has enjoyed extraordinary growth, and has a large trade in merchandise. Population, 151,575.

LOEB, Jacques, educator and author, born in Germany, April 7, 1859. After studying in Berlin and Munich, he took an extended course at Strasburg, where he was

granted a medical degree in 1884. In 1886-88 he was teacher of physiology at the University of Wurzburg, at Strasburg in 1888-90, and in 1891 came to the United States to fill an appointment at Bryn Mawr College. In 1892 he was made assistant professor of physiology at the University of Chicago, and in 1900 became professor. He takes high rank as an instructor, but is also noted for his advancement in scientific research. In 1899 he succeeded in developing larvæ from the unfertilized eggs of sea-urchins, and subsequently made similar experiments with other animals, including worms and the starfish. Several zoölogists have since verified these interesting experiments. Among the writings of Loeb are "Comparative Physiology;" "Organization and Growth;" "Limits of Divisibility of Living Matter," and "Artificial Parthenogenesis."

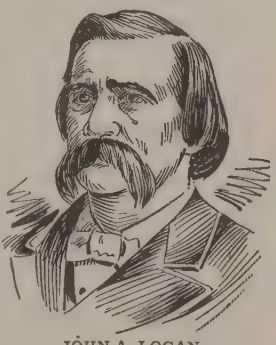
LOFODEN (lō-fō'dẹn), or **Lofoten,** an island chain situated northwest of Norway, stretching along the shore a distance of 175 miles, and containing an area of 2,250 square miles. Much of the surface is mountainous, the highest elevation being about 3,500 feet. The inhabitants engage largely in fishing and the cultivation of potatoes, oats, and barley. They also rear cattle, horses, and poultry. The fisheries yield considerable quantities of cod, herring, lobsters, and oysters. There is a considerable trade in stock-fish and cod-liver oil, but most of the fish are sold fresh. The celebrated maelstrom off Norway is situated in their vicinity, this being produced by the Great West fiord flowing between the islands and the west coast of Norway. The gulf stream modifies the climate perceptibly, and renders it favorable to sheep culture. Most of the inhabitants are Lapps and Scandinavians. Population, about 20,000.

LOG, (lŏg) an apparatus for ascertaining the rate of a ship's speed in the sea. It is usually in the form of a triangular piece of wood, called the log-chip, curved at the bottom, and loaded so it may float upright in the water. A strong line is attached to the log-chip, being wound around a reel, the axis of which projects, allowing it to turn freely when held in the hollow of the thumb and fingers. The log-chip is placed in the water and remains at rest, while the ship moves continuously on, and the speed is measured by the rapidity with which the log-line unwinds from the reel. The line is divided into sections, and the rate at which the vessel sails is determined by the number of sections that pass from the reel in a given time, the time being measured by an hour-glass, and the tests cover from twenty to thirty seconds of time. A log-book is kept on the vessel, which contains a journal of the progress made from day to day, together with events occurring on board, the state of weather, the number and class of vessels sighted, and many other circumstances of interest in the tour. Most ships also carry an official log-book in which to keep an account of sickness, offenses committed, disobedience of officers, and all general matters pertaining to the crew and passengers.

LOGAN, a city in Utah, county seat of Cache county, on the Logan River, about seventy miles north of Salt Lake City. It has good railroad connections, is surrounded by a rich farming and stock-raising country, and has excellent water power for manufacturing. Besides its public school system, it is the seat of Brigham Young College, Utah Agricultural College, New Jersey Academy, and Methodist and Episcopal academies. The city has several fine churches. Population, 1900, 5,451.

LOGAN, John, chief of the Cayuga Indians, born about 1725; died in 1780. He resided on the Susquehanna River and was friendly to the settlers, but in 1774 his family was massacred by white settlers on the banks of the Ohio River, and Logan instigated a war. Great destruction of property and life followed, but he and his band were defeated near the mouth of the Great Kanawha River. Shortly after he addressed a pathetic message to Lord Dunmore, governor of Virginia, in which he reviewed his wrongs. His death resulted from a misunderstanding, on account of which a party of Indians shot him, presumably in self-defense.

LOGAN, John Alexander, soldier and statesman, born in Jackson county, Illinois, Feb. 9, 1826; died in Washington, D. C., Dec. 26, 1886. He was the son of John Logan, an Irish physician, who served in the legislature of Illinois as a democrat. The son attended the common schools, and in 1840 studied at a college in Shiloh. At the age of twenty years he enlisted in the Mexican War, and became lieutenant in an Illinois regiment. His service in the war was of much merit, and for some time he was acting quartermaster of his regiment. Subsequent to the war he entered the Louisville Law School and studied for a time in the law office of his uncle, Alexander M. Jenkins, and soon after was admitted to the bar. He formed a law partnership with his uncle, and in 1849 became clerk of Jackson county. In 1851 he was elected to the legislature to represent Jackson and Franklin counties, was twice reëlected, and in 1854 served as presidential elector on the democratic ticket. He was elected to congress in 1858, and reëlected in 1860, but as soon as the Civil War began he resigned his seat in congress and enlisted for service in the Union army. His friends urged him to



JOHN A. LOGAN.

become a candidate for reëlection to congress in 1862, but he declined, saying, "I have entered the field to die, if need be, for this government." He fought at Bull Run, Belmont, Fort Henry, and Fort Donelson, attaining to the rank of brigadier-general in 1862, and after displaying skill and bravery at Corinth and in the Mississippi campaign, he became major-general in the fall of the same year. He took an efficient part in the battle of Vicksburg, and on the battlefield of Atlanta succeeded McPherson in the army of the Tennessee.

In the presidential election of 1864 General Logan gave vigorous support to Lincoln, making many impressive speeches in the western states. After the election he returned to Savannah, took part in Sherman's march through the Carolinas, succeeded General Howard in 1865 as commander of the army of the Tennessee, and in the fall of the same year resigned from the service. President Johnson appointed him minister to Mexico soon after, but he declined. In 1866 he was elected to congress as a republican, and was reëlected in 1868 and 1870. He became a United States senator in 1871, and was elected to the same position in 1879 and in 1885. The republicans nominated him for the vice-presidency in 1884, on the ticket headed by James G. Blaine, but he was defeated. General Logan has a fine record as a soldier and statesman. He was one of the founders of the Grand Army of the Republic, became its first national commander, and promoted the observance of Memorial Day as a national holiday. He wrote "The Great Conspiracy" and "Volunteer Soldier of America," the latter being published after his death. His son, John A. Logan, born in Illinois, July 24, 1865, studied at West Point, and rose to the rank of major. On Nov. 12, 1899, while leading his battalion at San Jacinto, Philippine Islands, he was slain by the entrenched enemy.

LOGAN, Mount, the highest mountain in North America, located in the Dominion of Canada, near the Alaskan boundary, about twenty-six miles northeast of Mount St. Elias. In 1892 J. H. Turner, United States surveyor, placed its height at 19,514 feet, which is considerable higher than Mount St. Elias, previously thought to be the most elevated peak in North America.

LOGANSPORT, a city in Indiana, county seat of Cass county, at the confluence of the Eel and Wabash rivers, seventy miles north of Indianapolis. It is noted as a railroad center and a commercial city. Its general facilities include electric lights and street railways, waterworks, sewerage, several parks, and a public library. It has manufactures of flour, ironware, machinery, woolen goods, clothing, cigars, and farming implements. The surrounding country is a fertile farming and dairying district. It contains natural-gas and coal deposits, and is rich in the production of all kinds of domestic stock. There are excellent schools, many fine churches, and a public library. It also has a fine county courthouse, a state normal school, a state asylum for the insane, and is the seat of a Universalist college. Population, 1900, 16,204.

LOGIC, the science which treats of the formal laws of human thought. It deals with all the forms of thought: of conception, judgment, reasoning, and construction, and bases its principles on the logical axioms. As understood at present, it is a development and modification of the art of reasoning molded into consistent shape by Aristotle in his treatise entitled "Organon of Aristotle." This work is based partly on the writings of Socrates, who treated the art in a general way, and notably on the treatises of Zeno of Elea. The Scholastics were the first to develop the logic of Aristotle, and by them the art was made an independent power in great theological debates. At the time of the Reformation, particularly in continental Europe, Scholasticism was depreciated, and down to the first half of the 19th century there was little dispute as to how logic should be defined, but since then have originated many different definitions.

According to Whately and Sir W. Hamilton, logic is limited in its application to the form of thought, and has nothing to do with the matter; that is, it deals with the form common to all reasonings, judgments, and concepts, but is not concerned about the content or subject of either. If this view is held, logic is only deductive, but John Stuart Mill founded the system of inductive logic, according to which the evidence, methods, and principles involved in scientific research must be regarded the principal subjects of interest in the art. Both the inductive and deductive systems are reviewed by the German philosopher Kant, and in his writings thought is recognized as the essential factor of cognition, thus holding the matter and not the form as the paramount element of importance in logic. The system of Kant is now accepted as a standard, since it holds that thought or intelligence is realized through the system of forms used in logic, thus making thought instead of mere form the basic element in logical procedure. In its method it is either inductive or deductive, the two methods being the reverse of each other. The former proceeds from particulars to the general, the latter from the general to particulars. One is a process of analysis, the other a process of synthesis. Logic is also divided according to the forms of thought and expression into logic of concepts, treating of the term; logic of judgment, treating of the proposition; logic of reasoning, treating of the syllogism; and the logic of construction, treating of the system.

LOGWOOD (lŏg′wo͝od), a tree native to Central America, but naturalized in and exported from Jamaica and other West

Indian islands. It grows most successfully in moist and swampy regions, has pinnate leaves, small yellowish flowers, and attains a height of from thirty to fifty feet. The wood is dense and solid, particularly the

LOGWOOD. FLOWER AND SEEDS.

heart wood, which is so heavy that it sinks in water. This heart wood has a red color and is useful in the manufacture of dyestuff to produce dark red colors. To obtain the dyestuff the wood is ground into small pieces, after which the coloring matter is extracted, and by applying alkalies a purple color is secured, while acids give a paler tint to the red. The colors are not permanent, but are made so by a mordant. When iron is used for mordanting the fabric, the color produced is black; with chromium a green or black is secured, and with alumina a lilac and violet. Logwood dyes depend upon the crystalline hematoxylin, and are used largely in giving a black or brown color to calico, in making ink, and for producing colors useful in painting. An astringent medicine is also extracted from logwood.

LOHENGRIN (lō'ẹn-grĭn), a German poetic hero, being the subject of Wagner's celebrated "Lohengrin." The poem introducing Lohengrin was written in the latter part of the 13th century, according to which he was a guardian of the Holy Grail, and was sent by King Arthur to battle for Princess Elsa of Brabant. The vehicle in which he undertook the journey was drawn by a swan, and, after arriving at the seat of war, he overthrew all opposition and finally married Elsa. Subsequently he entered the campaign against the Hungarians, and later against the Saracens, but on his return to Cologne was persuaded by Elsa to explain his origin, on account of which he was immediately taken back to the Grail in accordance with his vow.

LOIRE (lwär), the most important river of France. Its source is in the Cevennes Mountains, from which it has a northwesterly course to Orleans, and thence flows nearly west into the Bay of Biscay. Canals connect it with the Seine, the Saone, and the harbor of Brest. Its basin is noted for fertility of soil and much wealth, and is estimated to constitute about one-fourth of France. The entire length is 685 miles, of which about 500 miles are navigable. On its banks are the cities of Nantes, Mayenne, Vienne, and Allier.

LOMBARD (lŏm-bär'), **Peter**, noted schoolman of the 13th century, born near Novara in Lombardy, in the year 1100; died in Paris, France, in 1164. He studied theology in the University of Paris under Abelard, became bishop of Paris in 1159, and was the first to be termed doctor of theology by the University of Paris. Several works of much value have caused him to be styled generally "The Master of Sentences." His works were treated in commentaries down to the Reformation. A collection of passages from the fathers of the Christian Church, relating to controversies in theology, entitled "Sententiarum Libri IV.," is his best known work.

LOMBARDS (lŏm'bẽrdz), a people distinguished for great valor in the early history of Europe, and so named from the long spears they carried, or from their long beards. They were a branch of the Germans, occupied originally the regions of the Lower Elbe, and in the 4th century began to develop opposition to Roman invasions. In the early part of the 6th century they came in contact with the Eastern Roman Empire by pressing southeast into the valley of the Danube, and in 1568 their king Alboin invaded Italy, where they operated in conjunction with the Saxons and occupied the northern portions, which has since been known as Lombardy. They did not only establish themselves firmly, but built churches and monasteries of much beauty, founded cities, and gradually became assimilated by the Italians. The Lombards possessed powerful kings in Autharis, Rothari, and Liutprant, the last named securing temporary dominion over all of Italy. In 774 the last king of Lombardy, Desiderius, was overthrown at Pavia by Charlemagne, who became king of the Lombards and Franks. The Lombards embraced Christianity in the early part of the 7th century, made extensive internal improvements, and carried on a large foreign trade, Lombard street in London deriving its name from their business relations.

Lombard architecture is an outgrowth of the Lombards and the Gothic invaders of northern Italy. It dates properly from the early part of the 9th century to the 13th century, and was derived from the more inferior Roman style. Many buildings of this style of architecture still remain, and examples of it occur both in Italy and as far north as the

Baltic in Germany, the connection between the two countries coming about during the existence of the former German Empire, or Holy Roman Empire, that included Italy. The most important of those remaining are in Italy. They embrace churches and other buildings, notably in Verona, Pavia, and Milan, the St. Michael Church at Pavia being the most prominent representative. The architecture differs from the classic largely in that it has a preponderance of vertical lines instead of horizontal, and also in that it utilizes the dome extensively. Both the grouping of piers and the arrangement of the transepts and choir are highly artistic.

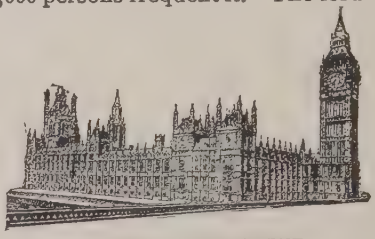
LOMBARDY (lŏm'bar-dĭ), a region of northern Italy, extending originally from the Alps to the Po River, and so named from the Lombards. The region belonged to the Romans prior to the Lombard invasion. In 774 it fell to Charlemagne, then passed consecutively to Germany and Spain, and in 1815 became a part of Austria, but since 1859 it has been a part of Italy. A department of Italy is now known as Lombardy, but it does not include all of the region formerly known by that name. It embraces seven provinces, has an area of 9,085 square miles, and a population of 3,922,850. The provinces include Brescia, Como, Bergamo, Pavia, Milan, Cremona, and Sondrio. Formerly the province of Mantua was included also, but it is now a part of Venetia.

LOMBOK (lŏm-bŏk'), an island in the Indian archipelago, belonging to Holland. It is situated a short distance east of Java. The island is of volcanic origin, has several mountain ranges, but is well watered and fertile. Among the products are cereals, fruits, live-stock, tobacco, and coffee. Most of the inhabitants are Mohammedans. Mataram is the capital. The total area is 2,390 square miles; population, 410,180.

LONDON, capital of the British Empire, situated in England, on the Thames River about sixty miles from the sea. It is the most populous city in the world, and has a length from east to west of about fourteen miles, and from north to south of ten miles. The city must be understood from various standpoints in order to appreciate the effort put forth by a vast number of people to live together in a single city. There are at least four Londons: one for registration purposes, another under the county council, a third including boroughs for parliamentary representation, and a fourth embracing a number of suburbs. The different divisions may be classified as follows:

NAME.	ACRES.	DWELLINGS.	POPULATION.
Registration London...	74,672	544,980	4,230,680
County Council London	75,442	550,835	4,385,217
Parliamentary London.	80,148	582,760	4,536,034
Greater London...	448,560	810,645	5,885,725

The city of London is included with Southwark in a separate corporation. The latter has an area of 670 acres and a night population of 38,500, but in daytime about 310,000 persons frequent it. The lord mayor



HOUSE OF PARLIAMENT.

of London is at the head of the civic corporation, and there are various districts for the election of aldermen and minor offices. Being the capital, it contains the residence of the sovereign and court of the British Empire. One of its finest structures is the house of parliament, but it also contains many governmental department buildings, and many celebrated commercial, educational, religious, and financial institutions.

The history of London begins about the year 43 A. D., when the Romans were in possession of the southern part of Britain, and founded a military station on the present site of London. An insurrection of the British led by Boadicea burned it in 61 A. D., and it was the center of various disturbances until about 306, when Constantine constructed walls and fortifications, and thereby established stability and laid a firm basis for commercial prosperity. It was the capital of Britain in 369-412, when it was known as Augusta, and subsequently became the seat of Saxon influence. King Alfred expelled the Danes and fortified the city. Its prosperity became famous at the beginning of the reign of Edward III. In 1664-66 the plague raged, when about 69,000 persons succumbed to the dreaded disease, and in the latter year a destructive fire spread over 340 acres, burning about 15,000 houses. From these calamities the city recovered with marked rapidity. The Bank of England was established in 1694; Sir Hans Sloane founded the British Museum in 1759; the old walls were torn down in 1760, and about that time the streets were improved by pavements, lighting, and efficient sanitary regulations. In 1840 the present parliamentary buildings were commenced, and in rapid succession followed the construction of great aqueducts, parks, street railway lines, and many other modern municipal improvements. At present there is a vast system of electric street railways and suburban railroad lines, numerous substantial bridges across the Thames, and many parks and squares. The principal parks include Hyde Park, Green Park, Regent's Park, and St. James' Park, these being royal parks, but there are many others of large extent. It is noted especially for

its valuable and extensive botanical and zoölogical gardens, containing magnificent collections of plants and animals, including specimens from all lands. The sanitary conditions are well guarded by a large corps of public officers. A vast sewer system carries the sewage far out of the city, and is thoroughly flushed by an adequate water supply drawn from the Thames, the Lea, artesian wells, and from other sources.

London is a city of magnificent public buildings, the most important of which include the government buildings, such as the house of parliament, erected at a cost of $15,000,000; Buckingham palace, Marlborough house, St. James' palace, and the Tower, the last named being situated near the city on the bank of the Thames. The British Museum is a valuable national collection, containing specimens that represent all the arts and sciences, and cover all the centuries included in the history of man. Besides it are the South Kensington Museum and its branch at Bethnal Green. Among the churches may be enumerated St. Paul's Cathedral, Westminster Abbey, Whitefield's Chapel, St. George's Church, St. Bartholomew the Great, St. Mary le Bone, St. Giles', and Cripplegate. All the churches in the city taken collectively number about 2,250, many of which are of historic interest and include the various representative styles of architecture. The city has a fine system of public schools. It also contains a large number of noted institutions of higher learning, including the University of London, Westminster School, King's College, Charter House School, St. Paul's College, Christ's Hospital, City of London Schools, and the Merchant Tailors' School. Beautiful monuments and statuary adorn the public squares and parks, among them the national memorial to Prince Albert, in Hyde Park, a splendid structure; the Nelson Column, Trafalgar Square; a public monument on Fish Street Hill; the Guards' Memorial, and Cleopatra's Needle on the Thames.

The city contains a large mixture of different races of people. The most numerous of those not English are included in the following: Irish, 300,000; Scotch, 185,000; German, 165,000; French, 60,000; and Jewish, 50,000. There are many excellent religious and scientific societies. Numerous different periodicals are published, including publications in various languages and representing all classes of news and professions. A progressive educational spirit prevails among the people. The lord mayor is elected annually. In his official duties he is aided by a body of aldermen, common councilmen, and an adequate police force. The city government, like that of other large cities of Europe, is efficient, rigorous, and progressive.

Commercially London is of vast importance. Its manufactures are enormous, embracing musical instruments; cotton, silk, and woolen goods, jewelry, vehicles, clocks, machinery, utensils, engines, ships, furniture, and many others. The annual volume of business transacted by the clearing house aggregates about $35,500,000,000. There are proportionally vast banking institutions, insurance companies, and business and manufacturing establishments. About 55,000 ships enter and clear the port of London annually, while the annual exports aggregate $385,500,000. There is a large commercial trade with the United States and all the principal nations of the world. Besides the different systems of street railway lines, fully 18,000 cabs and 25,000 omnibuses are employed constantly. The street railway system includes underground and elevated car lines, nearly all of which are propelled by electricity. Electric and gas lighting extends generally over the city. There are splendid pavements and aqueducts in all places where the needs of extensive traffic demand such improvements. Since the year 1801 the population of London has increased about sixfold, and it is still growing in population and magnitude. Many noted men have resided in London, being attracted by the advantages offered in its celebrated schools, museums, libraries, and industrial institutions.

LONDON, a city of Ontario, in Canada, county seat of Middlesex county. It is located on the Thames River, and is extensively connected by railway, giving it many advantages commercially. The city has electric lights, several libraries, a fine school system, and is the seat of Huron College and insane and orphan asylums. The manufactures embrace oil, ironware, chemicals, machinery, cigars, woolen goods, suspenders, and utensils. The surrounding country is agricultural and stock-producing. Population, 1901, 37,981.

LONDON, University of, a celebrated university of London, England, founded in 1825. It was originally known as University College, but in 1836 two charters were granted, one establishing University College and the other London University, the latter having power to grant degrees, but the former serving as a preparatory institution for the university proper. In 1878 these institutions were made co-educational. Admission may be secured at the age of sixteen years. Extensive courses are maintained. In connection with the institution is a fine library.

LONDONDERRY (lŭn'dŭn-dĕr-ĭ), a seaport city in the north of Ireland, situated on the Foyle River, capital of a county of the same name. In the year 546 the monastery of St. Columba was founded on its site, around which the city developed. It has Protestant and Catholic cathedrals, a number of public schools, and is the seat of several institutions of higher learning, among them Magee College. There are good railway connections, modern municipal facilities,

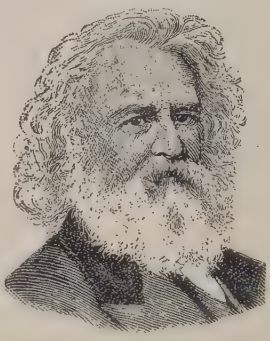
and manufactures of spirituous liquors, shirts, ironware, lumber products, and ships. It is the residence of a bishop. In the early period of the Reformation in Britain it became a stronghold of Protestantism, and in 1689 it was besieged by James II.

LONG, John D., lawyer and statesman, born in Buckfield, Maine, Oct. 27, 1838. In 1857 he graduated from Harvard University, studied law, and in 1861 was admitted to the bar. After serving in the state legislature of Massachusetts in 1875-78, he became lieutenant-governor, and in 1880-82 was governor of that state. President McKinley appointed him secretary of the navy in 1897, in which position he gave evidence of much executive ability during the war with Spain. None of the severe criticism applied to the war department was made of his office. Besides writing a volume of poems, he made a translation of the "Æneid." He continued in the office of secretary of the navy after Roosevelt became president.

LONG BRANCH, a town of Monmouth county, New Jersey, at the mouth of the Shrewsberry River, twenty-eight miles south of New York City. It is noted as a fashionable summer resort, having many commodious hotels, fine residences, and a life-saving station. The town stretches about five miles along the beach. It has good railway and electric car line connections, and contains manufactures of shirts, flour, lumber products, asphalt, and machinery. The summer population often exceeds 30,000, but the permanent population, according to the census of 1900, is 8,872.

LONGEVITY (lŏn-jev'ĭ-tў), the term employed to designate the duration of life of a people or an individual. Careful investigation has proved that women have an average duration of life somewhat longer than that of men, while a people combining intellect with virtue possesses the greatest longevity. In studying the tendency to live long three elements are taken into account: longevity, fecundity, and vigor. Human life does not generally reach seventy years, while ninety is very rare, but there are instances in which persons of regular habits and extraordinary physical strength endured more than one hundred years. The greatest duration of human life mentioned in writings coming to us from ancient times is that spoken of in the Bible, especially in the time before the deluge. Methuselah's age was 969 years, being the greatest on record, but some have subjected the accuracy of the record to criticism. It is recorded that Abraham was 175; Isaac, 180; Jacob, 147, and Joseph, 110 years at the time of death.

LONGFELLOW (long'fĕl-o), **Henry Wadsworth**, eminent poet, born in Portland, Maine, Feb. 27, 1807; died March 24, 1882. He was the son of Stephen Longfellow, an eminent lawyer of Portland. When fourteen years of age he entered Bowdoin College, where he graduated in 1825. Soon after he undertook the study of law in his father's office. However, he was offered a professorship of modern language in Bowdoin College, and with the object of fitting himself more particularly for that line of work went abroad to study modern languages, for which purpose he visited several European countries, remaining there about three years. On returning to America he gave his lectures on "Modern Literature and Language" at the college, and wrote numerous contributions for the "North American Review" and other periodicals. He remained at Bowdoin College five years, and within that time published his first volume, entitled "Essay on the Moral and Devotional Poetry of Spain," which was accompanied by translations from Spanish verse. The first of his prose writings appeared soon after as "Outre Mer." It is a description of his European life and travels. In 1835 he was invited to the professorship of modern languages and literature at Harvard University, and again went to Europe for special study, giving particular attention to Switzerland and the Scandinavian countries. About that time his young wife died, which was the occasion of his poem, "Footsteps of Angels." He held his professorship at Harvard eighteen years, resigned in 1854, but continued to live in Cambridge until his death, occupying a house used as Washington's headquarters at the beginning of the Revolution.



HENRY W. LONGFELLOW.

The literary life of Longfellow began properly with his college days, and his writings continued to the time of his death. His productions show a wide range of sympathy and taste, and great versatility in the poetic art. Many of his writings give evidence that he was a careful student of many countries and ages, and that he exercised a marked purpose in giving the world the results of his valuable research. He is noted for his friendly associations, traces of which are found in several of his poems, these being personally addressed to friends, or he distinctly alludes to them, thus furnishing the reader the pleasant companionship so thoroughly enjoyed by the poet. In 1861 his life was saddened by the death of his wife, whose dress caught fire as she sat among her children, and she was burned to death. This incident occasioned the translation of Dante's "Divine Comedy." In 1881 he wrote a poem on the death of President Garfield, and his last poetic production was published in the year of his death, entitled "Bells of San Blas." Longfellow had two sons and

three daughters by his second wife. No American poet is admired and praised more than Longfellow, and none is more worthy of admiration. Degrees were granted him by Cambridge and Oxford. The public schools of the United States commemorate his birthday as a favorite memorial. His writings, besides those named above, include "Hyperion;" "Voices of the Night;" "Poets and Poetry of Europe;" "Poems on Slavery;" "Building of the Ship;" "Evangeline;" "Golden Legend;" "Hiawatha;" "Courtship of Miles Standish;" "Tales of a Wayside Inn;" "Aftermath and Christus;" "Poems of Place;" "New England Tragedies;" "Belfry of Bruges and Other Poems;" "Hanging of the Crane," and "Masque of Pandora."

LONG ISLAND, an island situated between Long Island Sound and the Atlantic Ocean, forming a part of the state of New York. Its length from east to west is 117 miles, breadth from ten to twenty-four miles, and area 1,682 square miles. It is separated from New York City by the East River. Near it are several small islands. It has an undulating surface and contains a number of small lakes. Formerly the island was covered by a heavy growth of timber, and there is still a portion of the surface in primitive forest, consisting largely of oak, chestnut, hickory, and pine. Much of the soil is productive, especially in the northern part, but in the southern portion are a number of sandy plains and a series of lagoons. The fisheries yield oysters and many species of fish. The coast has several large bays, supplying many convenient harbors, and railroad lines traverse its entire length. Coney Island is noted as a summer resort, and Brooklyn is the principal city, but it was annexed to Greater New York in 1898. There are three counties on Long Island, including Kings, Queens, and Suffolk, the former two being included almost entirely with Greater New York. The Dutch founded the first settlement at the western end of the island in 1622. It was in the hands of the British during the greater part of the Revolution.

LONG ISLAND SOUND, an extension of the Atlantic Ocean between Connecticut and Long Island. Its width is from three to twenty miles. The greatest depth is about 200 feet, and it is navigable for the largest vessels. Several lighthouses are on or near its shore. The strait called East River connects it with New York Bay. It receives the water flowing from the Connecticut, Housatonic, Thames, and other rivers. The sound has valuable fisheries, and is important as a sailing route to and from New York City.

LONGITUDE (lŏn'jĭ-tūd), the distance measured in degrees on the earth's surface due east and west from a given meridian. Latitude and longitude enable us to locate the exact position of a place upon a globe or map. Longitude is measured along the equator or a parallel of latitude, and is generally reckoned from the meridians of Washington, Greenwich, Berlin, or Paris, the larger number of school texts used in America giving longitude east or west of Washington or of both Washington and Greenwich. It is expressed in degrees, minutes, and seconds, or in time, 15° being equal to one hour. At the conventional point the longitude is 0°, and longitudes are reckoned east and west from it to 180° in arc, and to twelve hours in time. The reason that degrees, minutes, and seconds of longitude are reduced to equivalent denominations of time by dividing by fifteen is that the earth turns through 360° of longitude from west to east in twenty-four hours, or 15° in one hour. At the equator degrees of longitude are longest, being generally stated at 69½ statute miles, but more properly at 69.16 miles, while at the poles they are designated 0°. The cause of degrees of longitude being shorter as we approach the poles is due to the fact that the earth is a sphere. See **Latitude**.

LONG PARLIAMENT, a term used to designate the fifth parliament summoned by Charles I. of England. It met Nov. 3, 1640, was twice expelled and twice restored, and dissolved of its own accord March 16, 1660. See **Cromwell**.

LONGSTREET, James, soldier, born in Edgefield district, South Carolina, Jan. 8, 1821. In 1842 he graduated at West Point and was assigned to the infantry. He served in the frontier wars until 1846, when he entered service for the Mexican War, and after being wounded at Chapultepec served as paymaster in the United States army, attaining to the rank of major. At the beginning of the Civil War he resigned to enter the Confederate service under Beauregard, serving at the battle of Bull Run, and in 1862 became major-general. He accompanied General Lee in the campaigns against McClellan, Pope, Burnside, and Meade, and after the battle of Fredericksburg was promoted to the rank of lieutenant-general. Subsequently he rendered efficient service in the battle of Gettysburg, commanded in the campaign of the Wilderness, in which he was severely wounded, but recovered sufficiently to aid in defending Petersburg, and in April, 1865, surrendered with General Lee. General Longstreet became an active worker for harmony between the north and south soon after the war closed. After the amnesty he was appointed by President Grant as surveyor of the port of New Orleans, and later served as commissioner of engineers for Louisiana a term of four years. In 1880 he became minister to Turkey, but returned to America in 1881, and shortly after was made United States marshal in Georgia. Among the Confederate soldiers he was familiarly called "Old Pete," and was a gallant soldier. He died Jan. 2, 1904.

LOO-CHOO, or **Liu Kiu**, or **Riu Kiu**, an island group situated in the Pacific Ocean, between Formosa and Japan. It is of vol-

canic origin, but has a fertile soil, and is populated principally with descendants of the Japanese. However, the prevailing customs are mainly of Chinese origin. Among the products are minerals, wheat, rice, sugar cane, maize, sago, sweet potatoes, tobacco, indigo, fish, domestic animals, and many varieties of fruits. Great Loo-Choo and Oshima are the two largest of the group, the former having an area of 500 and the latter of 290 square miles. The islands have belonged to the Japanese Empire since 1774. They contain several market towns, among them Napa and Shuri; the latter is the capital. The islands have a population of 360,280.

LOOM, a machine in which yarn or thread is woven into fabric by crossing of threads called warp or chain, running lengthwise, with others called woof, weft, or filling. Looms were used for weaving fabrics by peoples in remote antiquity, Pliny attributing the invention of cotton weaving to Semiramis. In Babylon looms were used very extensively, and those of Babylonian manufacture maintained their celebrity long after the fall of the Assyrian Empire. The first machine-power loom was invented by Cartwright of England in 1787, since which time many valuable improvements have been made, but hand-looms are still used for some purposes and also in countries not highly progressive. The principal parts of a loom are its frame, in which the row of yarn that forms the warp is held; and the harness or leshes, which govern the interlacing of the threads to form a shed for the woof. In 1876 an important improvement was made in the manufacture of looms by the Hunt Loom and Fabric Company of San Francisco. This consists of an attachment by which the loom becomes self-feeding, and overcomes the waste of weft. In this machine there is no intermission in the operation of weaving, except to make repairs, and, if a break of the warp-thread occurs, the loom is stopped automatically and a signal bell rings. This invention has made it possible for a large number of looms to be operated by a single attendant. Looms of different construction are used in the manufacture of all classes of fabrics, such as silk, woolen, cotton, and linen goods. They also serve in the manufacture of different classes of cloths, matting, and carpeting.

LOOMIS (loo'miss), **Elias**, physicist and author, born in Wellington, Conn., Aug. 7, 1811; died in New Haven, Aug. 16, 1889. He graduated at Yale in 1830, studied in Paris, and served as professor of natural philosophy in the Western Reserve College, Ohio, in 1837-44, when he secured a like position in the University of the City of New York, serving there in 1844-60. Subsequently he became professor of philosophy and astronomy at Yale. On January 23, 1849, he announced valuable discoveries in regard to the velocity of electricity on telegraph wires. His published works include "Progress of Astronomy;" "Treatise on Meteorology;" "Natural Philosophy," and "Analytical Geometry and Calculus."

LOPE DE VEGA. See **Vega**.

LOPEZ (lo'pĕs), **Narciso**, Cuban soldier, born in Caracas, Venezuela, in 1799; suffered death by strangulation in Havana, Cuba, Sept. 1, 1851. He descended from Spanish parents, sided with the revolutionists in Venezuela, but later went over to the Spanish army and secured a promotion to the rank of colonel. After Venezuela became independent, he visited Spain, where he served against the Carlists, and in 1839 became major-general and was appointed governor of Valencia. Later he settled in Cuba. He held several offices of trust under the governor-general until 1843, when he became identified with the revolutionists, and in 1849 visited the United States for the purpose of promoting the annexation of Cuba. Subsequently he organized several attempts to liberate Cuba from the Spanish. His expedition in 1849 was prevented by the United States. The following year he landed at Cardenas, but was forced to retire. In 1851 his expedition of 500 volunteers landed at Murillo, but, owing to a lack of support, he was defeated and captured, and shortly after executed by the garrote.

LORAIN, a manufacturing city of Ohio, in Lorain county, on Lake Erie, twenty-four miles west of Cleveland. It has railroad and steamboat facilities, electric lights and street railways, waterworks, pavements, and is a growing market for merchandise. There are manufactures of iron and brass wares, clothing, earthenware, and machinery. It is the seat of the Johnson Steel Works, at which about 2,000 persons are employed. The city has good schools, several fine churches, and in the vicinity are deposits of natural gas. Population, 1900, 16,028.

LORCA (lŏr'kä), an old Moorish city of southern Spain, situated in the province of Murcia, about forty-two miles southwest of the city of Murcia. The surrounding country is fertile and contains lead mines. Lorca consists of two portions, the old and the new towns; the foundation of the former was laid by the Moors. The manufactures embrace linen and woolen goods, soap, leather, machinery, and earthenware. Lorca has several fine churches and hospitals, and is supplied with a number of modern facilities. Population, 58,490.

LORELEI (lō're-lī), a precipitous elevation on the Rhine River, half a mile above St. Goar, Germany. It has a height of 427 feet, is now penetrated by a railway tunnel, and was made famous by Heine's celebrated "Volkslied." This exquisite poem represents a siren seated upon the lorelei, by whose charms and beautiful song boatmen were attracted to a whirlpool at the base of the rock and there met destruction. The scenery at the cliff is the most beautiful on the

Rhine, and near it is a basin noted for its productive trout fishery.

LORETO (lō-rā'tō), or **Loretto**, a small town of Italy, situated on a railway line, about fifteen miles south of Ancona and three miles west of the Adriatic. It is noted as the seat of the Holy House, which, according to tradition, was occupied as a dwelling by the Virgin Mary at Nazareth, and in 1295 removed to Loreto. The building was originally of simple construction, but it has been finely improved by sculptures in marble. The town is visited by many tourists annually, who go there to view the structure and witness an image of the Virgin, which is reputed to be a carving by St. Luke. The town has a population of 4,695. An order of Catholic nuns, known as Sisters of Loreto, took its name from the town. The order was founded by Charles Nerinck in 1812, and the first community was established in Kentucky, since which time it has spread rapidly, devoting its efforts to the care and education of poor orphans. The principal academy of the order is situated at Florissant, Missouri.

LORNE (lôrn), **John George Douglas, Marquis of**, statesman, eldest son of the duke of Argyll, born in London, England, Aug. 6, 1845. He studied at Eton, St. Andrew's University, and Cambridge, served as a liberal in parliament in 1868-78, and in the latter year was appointed governor-general of Canada, serving in that capacity till 1883. He married Princess Louisa, sixth child of Queen Victoria, in 1871. He is author of "Life of Lord Palmerston;" "Trip to the Tropics and Home through America;" "Guido and Litta," and "Psalms Literally Rendered in Verse."

LORRAINE (lŏr-rān'), called **Lothringen** in German, and so named because it formed a possession of King Lothaire II. Originally it included Friesland, Alsace, and the regions lying between the Meuse, Rhine, and Scheldt, and in 954 became divided into Upper and Lower Lorraine. The latter now forms a portion of the kingdoms of Belgium and Holland, being known in Belgium as Brabant, and as Brabant and Guelderland in Holland. France secured Upper Lorraine in 1766, but at the close of the war between Germany and France, in 1870-71, a large portion of it was ceded to Germany. The German portion includes the two fortified cities of Metz and Thionville, and embraces part of the Alsace-Lorraine (q. v.) territory.

LOS ANGELES (los ăn'hĕl-ĕs), an important city of Los Angeles county, California, situated 345 miles southeast of San Francisco. The city is connected by railroads with other trade emporiums of the Pacific coast and the central west. It has a location remarkable for health and beauty, and is a favorite pleasure and health resort for eastern tourists. Many people go there to spend the fall and winter seasons. The manufacturing establishments represent a capital of about $12,500,000 and employ 7,500 persons. The surrounding country is rich in the production of fruits, cereals and minerals, the last named products including coal, petroleum, gold, and silver. It has a splendid public school system and contains a state normal school, St. Vincent College, the Medical University of Southern California, and several Catholic seminaries. There are electric lights and street railways, public parks, libraries, and substantial pavements. The manufactures embrace bicycles, machinery, packed goods, flour, fertilizers, crackers, utensils, candy, and earthenware. The city has a large and growing commercial trade. Population, 1900, 102,479.

LOSSING (lŏs'ing), **Benson John**, historian, born in Beekman, New York, Feb. 12, 1813; died June 5, 1891. After securing an education, he became a watchmaker at Poughkeepsie in 1826, and in 1835 left that occupation to become proprietor of the "Poughkeepsie Telegraph." In 1838 he engaged as wood-engraver in New York City, edited the "Family Magazine" in 1838-40, "Young People's Mirror" in 1848-49, and the "Philadelphia American Historical Record" in 1872-75. He collected a large number of valuable histories and biographies, contributed to "Harper's Magazine," and made a collection of documents relating to American history. His writings embrace "Cyclopædia of American History;" "History of the United States;" "Civil War in America;" "American Centenary;" "History of the City of New York;" "Vassar College and its Founder," and "Life of Washington."

LOT, the son of Haran and nephew of Abraham. He accompanied Abraham to Canaan, but later the two separated because of quarrels among their shepherds, and Lot settled in Sodom, the vicinity being well watered by the Jordan and suitable for his herd. When the city of Sodom was to be destroyed, he and his household were warned in time, but on the journey his wife was turned to a pillar of salt on account of looking back, but he and his two daughters escaped safely. From Lot descended the Ammonites and Moabites. The dead Sea is called Bahr Lut in Syriac, meaning Sea of Lot.

LOTTERY, an institution for the distribution of prizes by lot or chance. The general plan is to prepare a number of tickets, which are sold at a specified price, the larger majority of which are blank, thus making the income much larger than the amount expended. Lotteries were of common occurrence among the Romans, and are now sanctioned for the support of charities and religion, but as a general institution are prohibited in most countries. The lotteries of many European countries took on the worst form of gambling and dishonesty in the middle of the 16th century, on account of which prohibitive measures were adopted and the institution suppressed. In America the first

lottery was sanctioned by the Virginia Company in 1612, and in 1776 the American congress passed an act legalizing lotteries for schools, roads, and other public improvements. Subsequently many frauds were perpetrated, which led to limiting and prohibitive legislation. The most extensive lottery of the United States was the Louisiana State Lottery at New Orleans, which was finally suppressed by the state constitution in 1895, and also by an act of the United States congress forbidding the use of the mails in the management of its business. It is singular that there is a tendency in the human breast which prompts individuals to invest their hard-earned money in lottery tickets, thereby taking chances along with others in winning prizes, knowing such an institution is absolutely certain to take more from the investors than is returned.

LOTUS (lō′tŭs), a name derived from the lotus of Greek legend, and applied to various species of plants related to the clovers. It

COMMON LOTUS.

is now used also to designate several species of the water-lily family, particularly the sacred species of Egyptian lilies that grow in the Nile regions. The species common to the Nile thrive also in various other parts of northern Africa and southern Eurasia. They produce roots that are eaten by people residing in the vicinity of Lake Manzeleh. The name is applied in the United States to a beautiful water plant commonly called chinquapin, and in Arabia to several species of thorny shrubs that grow in the desert. The lotus of Egyptian mythology is, perhaps, the same class of fruit referred to by Homer in the account where companions of Ulysses were persuaded to eat the lotus with the design that the participants would, as a result, desire to remain forever in the country where the lotus thrives, but the exact kind of fruit implied by the term is not known. The so-called common lotus is a favorite flowering plant grown extensively in gardens and houses. It has white flowers and large leaves. Lotus plants of the clover family are called bird's-foot trefoil. They are creeping vines with perennial roots.

LOTZE (lot′seh), **Rudolf Hermann**, philosopher and author, born in Bautzen, Germany, May 21, 1817; died in Berlin, July 1, 1881. He took a complete course of instruction at Leipsic, became professor of philosophy at the Leipsic University in 1842, and in 1844 secured a like position in the University of Göttingen, where he spent nearly forty years of his life. In 1881 he was called to Berlin, but soon after died. He was not only a forceful teacher, but a public lecturer and writer, though his system of philosophy was not announced until after long years of studious application. His philosophic system may be regarded as idealism associated with teleology. According to it every material change in the universe, as well as the cause of all being, is explained by linking everything with the idea of the good. His first contribution to scientific literature was his "Handbook of Philosophy," published while at Leipsic. His later works include "Universal Pathology;" "System of Philosophy;" "Logical Psychology;" "On the Idea of Beauty;" "Microcosmus," and "General Physiology of Life."

LOUBET (lōō-bā′), **Emile**, president of France, born Dec. 31, 1838. His father was a peasant farmer who desired an education for his children, and consequently sent Emile to the school in his native town and afterward for law study at Berguin and Paris. Soon after completing his course he became an advocate in Paris, where he established a successful law practice. In 1876 he secured an election to the chamber of deputies as a republican, and was reëlected in 1877 and 1881. In 1885 he was chosen to the senate. Two years later he entered the portfolio of public works in the first ministry under President Carnot; later he held the portfolio of the interior, and in 1896 and 1898 was president of the senate. President Faure died on Feb. 16, 1899, and two days later Loubet was elected president of the republic in the national assembly by a vote of 483 out of a total of 812. The administration of Loubet demonstrates that

EMILE LOUBET.

he possessed firmness, integrity, and patriotism, and that his aim was to further the interests of France as a united and prosperous nation.

LOUIS, the name of eighteen kings of France, the most important of whom are treated in special articles, and the others reigned as follows: Ludwig I. (q.v.), surnamed le Debonnaire, born in 778, succeeded his father, Charlemagne, in 814, died June 20, 840; Louis II., born Nov. 1, 846, became king Dec. 8, 877, died April 10, 879; Louis III., born in 863, became king in 879, died in 882; Louis IV., born in 921, became king in 936, died in 954; Louis V., born in 966, succeeded Lothaire in 986, and died in May, 987; Louis VI., born in 1078, succeeded to the throne in 1108, and died Aug. 1, 1137; Louis VIII., born Sept. 5, 1187, became king in 1223, died Nov. 8, 1226; Louis X., born in 1289, became king in 1314, died in 1316; Louis XII., born in 1462, became king in 1498, died Jan. 1, 1515.

LOUIS VII., king of France, son of Louis VI., born in 1120; died Sept. 18, 1180. He succeeded his father as king of France in 1137, and shortly after made an unsuccessful attempt to establish his rights as duke of Aquitania. This caused him to become complicated in several battles, and he offended the pope by destroying the beautiful cathedral at Vitry. As a result he was thrown into a quarrel, by which he was obliged to enter upon a crusade to the Holy Land, in 1147, but returned to France after two years, having lost a large number of his force. Henry II. of England married his divorced wife Eleanor, acquiring thereby Poitou and Guienne. His son, Philip Augustus, succeeded him as king of France.

LOUIS IX., king of France, commonly called St. Louis, eldest son of Louis VIII., born April 25, 1215; died near Tunis, Africa, Aug. 25, 1270. He succeeded his father in 1226, and when dangerously ill, in 1244, made a solemn vow to become a Crusader in case of recovery. Leaving his mother as regent, he sailed to Cyprus with an army of 75,000 men, and from thence sailed, in 1249, to Egypt for the purpose of conquering that region with the design of later making himself master of Palestine. However, the Mohammedans defeated him, made him a prisoner, and liberated him only after a heavy ransom. In 1254 he returned to France, inaugurated a policy of internal improvement, codified the laws, and founded a theological college at Paris. He undertook a second Crusade in 1270, and after taking the citadel of Tunis, in Africa, a pestilence broke out to which he succumbed. Boniface VIII. canonized him in 1287.

LOUIS XI., king of France, eldest son of Charles VII., born in Bourges, July 3, 1423; died Aug. 30, 1483. He succeeded his father in 1461, and soon after became involved in a war with Maximilian of Austria because the latter had taken charge of vacant fiefs in France, but at length the controversy was settled by an agreement that the dauphin should marry Margaret, the daughter of Maximilian, and come into possession of Burgundy and Artois. His rule was generally severe on the vassals, who held land under the feudal system, and, besides increasing the number of parliaments in the provinces, he weakened the feudal vassals by extending the right of suffrage to the middle classes. He founded three universities, encouraged commerce and manufactures, and stimulated internal improvements. In 1481 he became affected by apoplexy, on account of which he shut himself in his castle in great fear of sudden death. It was his ambition to overthrow the power of princes for the purpose of solidifying royalty and consolidating France, in both of which he succeeded to some extent. In 1469 the title of "Most Christian King" was conferred upon him by the pope.

LOUIS XIII., king of France, son of Henry IV., born at Fontainebleau, Sept. 27, 1601; died May 14, 1643. His father was assassinated in May, 1610, and he succeeded to the throne under the regency of his mother, Maria de Medici. He was declared of age in 1614, the following year married Anne, daughter of Philip III. of Spain, and his mother was exiled from the court. His reign was marked by armed opposition of the Huguenots, during which Cardinal Richelieu had charge of the imperial forces so far as directing affairs was concerned, and a treaty of peace was concluded in 1623. Hostilities ceased only momentarily, because the mother of Louis incited civil war and encouraged Huguenot opposition. However, the monarchy became strengthened under the guidance of Richelieu, the Protestant nobles were gradually weakened, and on Oct. 20, 1623, the Huguenot stronghold at Rochelle was captured, while the insurgents of the queen-mother were defeated at Castelnaudary. For the purpose of humbling the pride of Spain and Austria, he sided with Gustavus Adolphus in the Thirty Years' War, on account of which France secured Alsace, Rousillon, and the duchy of Bar.

LOUIS XIV., king of France, born at Saint Germain-en-Laye, Sept. 16, 1638; died Sept. 1, 1715. In 1643 he succeeded his father, Louis XIII., under the regency of his mother, Anne of Austria, with Mazarin as the minister. He formed a friendship with Spain while in his minority, but that country encouraged the discontented nobles for the purpose of weakening the crown, and a war resulted, which was concluded in 1659. In the same year Louis married Maria Theresa, the daughter of Philip IV., of Spain. The king's early education had been neglected, hence it was not thought that he would become a vigorous ruler, but when Mazarin died, in 1661, he assumed control of the government with much energy and soon won the title of Louis the Great, and the saying "I am the State" became a popular term in France to

designate his personality. The famous Colbert became his minister. During his incumbency important reforms were effected in the taxes and in the administration, and these were followed by improvements in the financial system, the construction of canals and highways, and the encouragement of manufacturing and educational arts.

LOUIS XIV.

Louis purchased Dunkirk from Charles II. of England in 1662, and, when his father-in-law died, he claimed Flanders and Franche-Comte, sending his armies there in 1667 under Condé and Turenne. A war with Holland resulted in 1672, and in six weeks he conquered half the country, but soon after an alliance was formed against him by Spain, Denmark, and William of Orange. The policy of his minister, Louvois, effected the enrichment of France at the expense of the conquered provinces, and the treaty of Nimeguen, in 1678, confirmed his title to Franche-Comte and a portion of Flanders. At that time the court of Louis was the most splendid of Europe, being adorned by eminent men, philosophers, poets, statesmen, and generals. Maria Theresa died in 1683. The following year he married Madame de Maintenon, and soon after secured the revocation of the Edict of Nantes, by which many thousands of progressive Protestants left France and carried their skill and industry to other lands. An alliance formed against him by Holland, Germany, Sweden, Spain, England, and other countries caused him to lose many of the conquered possessions, and, when the death of Charles II. of Spain occurred, Louis claimed the Spanish throne for a grandson of his sister, who had been the queen of Louis of Spain. In this movement he was opposed by a united Europe, in which the allies won in the battles of Blenheim, Ramillies, and Malplaquet, after which the peace of Utrecht was concluded in 1713. By it the French prince came in possession of the Spanish throne, but France lost some of its acquired colonies. Though the reign of Louis was eminently successful at first, the latter portion became marked with languor in industrial arts on account of continued war. His great-grandson, Louis XV., succeeded him as king.

LOUIS XV., king of France, great-grandson of Louis XIV., born in Versailles, France, Feb. 15, 1710; died May 10, 1774. He succeeded to the throne on Sept. 1, 1715, under the regency of the duke of Orleans, and in 1723 became ruler in fact. The regency period was marked by the financial schemes of John Law, by which the country came to a strained condition. On assuming the reins of government he made Cardinal Fleury minister, and about the same time married Maria, daughter of Stanislas Leczynski, the dethroned king of Poland. For the purpose of restoring his father-in-law to the throne of Poland, Louis became involved in war in 1733, by which his father-in-law secured Lorraine, and later this was added to France. In 1740 a war for the Austrian succession began, which at first was disastrous to France, but in 1745 victories were won at Fontenoy, and the treaty of Aix-la-Chapelle in 1748 concluded peace. While enlarging the colonies of France, the war caused the finance and navy to become greatly weakened. The Seven Years' War began in 1756, which resulted in Great Britain conquering Cape Breton, Canada, and large possessions in the East and West Indies, peace being concluded in 1763. In 1764 the Jesuits were expelled from France. Later financial embarrassments were brought upon the country by the extravagance and vices of Louis. At the time of his death France was in debt to the amount of $800,000,000.

LOUIS XVI., king of France, grandson of Louis XV., born in Versailles, Aug. 23, 1754; guillotined Jan. 21, 1793. He was a man of fine physique, skilled in manual arts and sciences, and grew up with the sincere regard of the better element. On May 10, 1770, he married Marie Antoinette, youngest daughter of Empress Maria Theresa of Austria, and in 1774 ascended the throne. He misunderstood the situation in France, giving himself up to festivities and the love of entertainment. The country being already impoverished, it was difficult to place the finances upon a basis of stability, and popular opposition to the privileged classes arose among the laborers and the common people. It was during this time that the American colonies were battling for independence, and the people of France were in strong sympathy with the American movement, giving both financial and moral support to the cause of liberty. In 1777 the general director, Necker, inaugurated a vigorous policy of taxation, placing the burdens upon poor and rich alike. He also instituted various internal reforms, improved the administration of justice, and sought the abolition of serfdom. These reforms were heartily supported by Louis, but opposed by the aristocracy, and the opposition created by the latter led to the Revolution of 1789. Excited masses of people thronged the streets of Paris, and eventually caused the destruction of the Bastille. In 1791 the king sought to escape from France, but was apprehended at Varennes and taken back to Paris. The royal palace was attacked on June 20, 1792, by the populace and the king fled to the national assembly for safety, but was put under

arrest. Soon after he was tried before the convention on a charge of conspiracy against national freedom, and was declared guilty by a vote of 690 out of 719 on Jan. 16, 1793. The following day he was condemned to be guillotined, which took place four days later. Immediately before execution he uttered these words: "I die innocent; I pray that my blood come not upon France."

LOUIS XVII., king of France, second son of Louis XVI., born in Versailles, March 27, 1785; died June 8, 1795. He was a boy of much promise, became dauphin on the death of his brother in 1789, and on the execution of his father remained a prisoner. Soon after he was forcibly separated from his mother and sister, and in 1793 given to the care of a fanatical Jacobin, from whom he received the most cruel treatment, which terminated in the loss of his mental and physical strength. It was thought that his death resulted from poison, but a commission of physicians reported in opposition to this view. "Peasant and Prince" is a beautiful and pathetic account of his life, written by Harriet Martineau.

LOUIS XVIII., king of France, grandson of Louis XV., born in Versailles, Nov. 17, 1755; died Sept. 16, 1824. He was titled count of Provence, married Maria, daughter of Victor Amadeus III. of Sardinia, in 1771, and received the title of monsieur at the time his brother, Louis XVI., ascended the throne, in 1774. When the latter sought to escape from France, the monsieur was more fortunate and reached Belgium in safety, whence he issued various manifestos that proved a serious damage to the king in relation to the Revolution. After the execution of Louis XVI., he proclaimed the son of the latter, Louis XVII., king of France. Immediately after the death of the latter he assumed the title of king, but spent a wandering life in different countries of Europe, receiving support from Bourbon friends and foreign courts. In 1807 he purchased a residence in England, where he remained until the fall of Napoleon, and then returned to France as the sovereign, entering Paris in May, 1814. When Napoleon returned from Elba, Louis fled from France, but after the disaster at Waterloo he was replaced on the French throne by the allies. His reign was characterized by severe opposition to Protestants and adherents of the Revolution, and was far from being liberal and constitutional. He was succeeded by his brother, Charles X.

LOUIS I. (loo-ē′), king of Portugal, second son of Queen Donna Maria II. and of the prince of Saxe-Coburg, born in October, 1838; died in Lisbon, Oct. 18, 1889. On Nov. 11, 1861, he succeeded his brother, King Pedro V., as king of Portugal, married the youngest daughter of Victor Emmanuel, king of Italy, in 1862, and ruled the Portuguese with much liberality and fairness. Besides being a man of culture, he was faithful to the constitution and devoted to literature. His translations include Shakespeare's "Hamlet," "Merchant of Venice," and "Richard III." He was succeeded by his son, Carlos, who was born Sept. 25, 1863.

LOUIS II., king of Bavaria, born in Nymphenburg, Germany, Aug. 25, 1845; died near Munich, in 1886. He was the grandson of Ludwig I. (1786-1868), king of Bavaria, and succeeded his father, Maximilian II., as king on March 10, 1864. In 1866 he supported Austria against Prussia, but in the war of 1870-71 he gave vigorous support to the Prussian army against France. He possessed an intense love of the beautiful in art and nature, but toward the latter part of his life became a recluse, which at length brought about mental weakness and his sad death by drowning.

LOUISA, queen of Prussia, surnamed the "Good Queen," born in Hanover, Germany, March 10, 1776; died July 19, 1810. She was the daughter of Charles, duke of Mecklenburg-Strelitz. In 1793 she married the crown prince of Prussia, afterward Frederick William III., and as queen commanded universal respect and affection. No life in German history shows a greater devotion and patience than hers in relation to the war between Prussia and France. She accompanied her husband to Königsberg immediately after the battle of Jena, and, when Prussia was brought to the mercy of Napoleon by the battles of Eylau and Friedland, she made a personal appeal to Napoleon at Tilsit for peace in her country. Among the institutions founded in her honor are the Louisa School for Girls, Prussian Order of Louisa, and Louisa Governess' Seminary. She was the mother of the Prussian kings, Frederick William IV. and William III.

LOUISBURG (lōō′ĭs-bûrg̃), a fortress built by the French on the southeast coast of Cape Breton Island, in Nova Scotia, after the peace of Utrecht in 1713. In the war between France and England, beginning in 1744, the fort was taken by New Englanders, but the peace of Aix-la-Chapelle restored it to France in 1748. General Wolfe besieged Louisburg in 1758 and compelled the French garrison to surrender, after which the town was destroyed entirely, and has remained in a ruined condition ever since. The fortress cost France $5,000,000 and was regarded the strongest in America. The town situated on its site is made up largely of fishermen. It has a lighthouse, good harbor, and a considerable trade in fish and produce. Population, 1,125.

LOUISIANA (lōō-ēz-ē-ä′na), a southern state of the United States, whose northern boundary is formed by Arkansas, eastern and southern by Mississippi and the Gulf of Mexico, and western by Texas. It has a total area of 48,720 square miles, about the size of New York. The surface has a general elevation of seventy-five feet above the sea-level, its highest altitude being not more

than 500 feet. Large areas of the surface are made up of alluvial deposits, including many coast swamps and a considerable number of inland lakes formed by silt deposits of the Mississippi River. Vast levees extend along both sides of the Mississippi in various sections to prevent the overflow of alluvial lands during high water. Fully one-half of the state is upland, which contains valuable forests, especially in the northern part. The general slope is toward the south, which is the direction of its water-courses. These include the Mississippi, Red, Washita, Sabine, Pearl, Calcasieu, Atchafalaya, and Ouachita rivers. The river navigation of the state includes about 3,775 miles, besides which are a number of lakes, including Calcasieu, Grand, Pontchartrain, Salvador, Maurepas, and several others of more or less importance. The rivers and lakes are connected by great bayous, and some of the streams, like the Red and Ouachita, have a width of from four to twenty miles at various points.

The soil and climate of Louisiana are alike favorable to the growth of luxuriant vegetation. At New Orleans the mean annual temperature is about 68°, while the general temperature of the state is from 60° to 96°. However, it frequently attains to 100° in the summer season, but the freezing point is rarely reached in any part of the state. Among the principal forest trees are the oak, pine, poplar, magnolia, cypress, beech, and cottonwood. All classes of tropical fruits abound, among them olives, oranges, lemons, pears, peaches, apples, quinces, and many other large and small varieties. Agriculture is one of the principal occupations, but not more than one-ninth of the surface is under cultivation. The principal products embrace sugar, cotton, rice, corn, oats, hay, tobacco, wheat, potatoes, and rye. Its production of sugar has long been the most important, averaging in value about $40,500,000 annually. The annual production of cotton aggregates $25,500,000; corn, $12,500,000; rice, $4,500,000, and fruits and vegetables, $3,800,000.

Live-stock culture in Louisiana is in a state of continuous growth. It embraces principally horses, mules, cattle, sheep, and swine. There are important manufactures of cotton and woolen goods, tobacco, spirituous liquors, machinery, utensils, furniture, leather, lumber products, and clothing. Sugar refining and rice polishing are also important industries. The mineral wealth embraces principally salt, sulphur, lead, and lignite. However, the salt deposits are the most important, occurring in solid beds of rock salt from forty to eighty feet deep, and are found in a region stretching from Belisle to Abbeville, and in the parishes of Iberia, Vermillion, and St. Mary. The vast extent of river and gulf navigation has delayed the building of railroads to some extent, but at present there are about 3,500 miles in the state, thereby connecting the principal productive regions with the various commercial centers of the south.

The state of Louisiana has provided amply for public education in schools and higher institutions. There is a general system of elementary education under state supervision, and this is supplemented adequately by state and private institutions devoted to industrial arts, sciences, professions, and moral culture. Benevolent, charitable, and reformatory institutions are maintained under a system supervised by the state. The state university, with departments in agriculture and mechanic arts, is situated at Baton Rouge, and a state normal school is at Natchitoches. The Southern University is endowed by the state; it is located at New Orleans. At Baton Rouge are asylums for the deaf, blind, and dumb; at Jackson is an asylum for lunatics, and at New Orleans is a large state hospital. Tulane University is one of the leading institutions of higher learning in the south; it is situated at New Orleans. Among the principal colleges supported by various societies are the Methodist Episcopal University, at New Orleans; Baptist Leland University for Negroes, New Orleans; College of the Immaculate Conception, New Orleans; Centenary College, Jackson; Keatchie College, Keatchie; Jefferson College, Convent; Thatcher Institute, Shreveport, and St. Charles College, Grand Coteau. The state contains many church organizations, representing all the leading denominations of the United States, the Baptist being largely in the majority. There are many representative periodicals, the whole aggregating about 225, of which twenty-five are daily and 165 weekly publications.

The history of Louisiana dates from 1541, when it was discovered by De Soto. La Salle took possession of it in 1642 for France, naming it after Louis XIV. Bienville made the first settlement at New Orleans in 1706, and John Law secured control of the colony in his Mississippi scheme about 1717. France ceded the territory to Spain in 1762, but again received title to it in 1800. It was Napoleon's ambition to found a New France in America, but in 1803 he was induced to sell it to the United States. The territory of Orleans was formed in 1804, and in 1812 it was admitted into the Union as the state of Louisiana. The final battle of the War of 1812 was fought at New Orleans on Jan. 8, 1815, after peace had been made at Ghent, but before the news had reached America. From that time the development of the state made rapid strides, expanding agriculture and manufacture, New Orleans becoming the most important cotton market and port of the south. On Jan. 26, 1861, the state seceded from the Union and cast its fortunes with the Confederacy, and on April 25, 1862, New Orleans was captured by United States forces. During the war it was an important

point because of many engagements occurring on the Mississippi River. After the war a carpet-bag element harassed the state during the reconstruction period. Subsequently it developed rapidly in every material line, building levees, railroads, canals, and cities, and founding vast civil institutions. It is divided into fifty-nine parishes, corresponding to counties in other states. Baton Rouge is the capital. Other important cities include New Orleans, Shreveport, Lafayette, New Iberia, Crowley, Carrollton, Alexandria, Plaquemine, Lake Charles, Donaldsonville, and Monroe. It is popularly called the Pelican State. The population, according to the census of 1900, is 1,381,625. This includes a colored population of 652,013, or 47.2 per cent. Of this number 650,804 are Negroes, 599 Chinese, 593 Indians, and seventeen Japanese.

LOUISIANA, a city of Pike county, Missouri, located on the Mississippi River, ninety-seven miles above St. Louis. It is connected extensively by railroads and has a good landing for steamboats. The manufactures embrace flour, tobacco, building stone, lumber, and earthenware. The surrounding country is fruit-growing and lumber-producing. It has a fine library, electric lights, and good schools. It is the seat of McClure College. Population, 1900, 5,131.

LOUISIANA PURCHASE, the most important annexation made to the territory of the original thirteen states. The purchase included a vast region extending from the Gulf of Mexico to the British possessions, west of the Mississippi River. Its exact boundaries cannot be stated definitely, but it includes all the territory belonging to the United States situated west of the Mississippi River, except Texas, California, a portion of Oregon, the Gadsden purchase from Mexico, the Mexican cession, and Alaska. The enterprise of coming into possession of this vast region was consummated by Thomas Jefferson, who appointed James Monroe a minister to act with Robert G. Livingston at the French court. The treaty was signed April 30, 1803, and the stipulated price was $15,000,000, of which $3,750,000 were claims of our citizens against France, which the United States agreed to assume. Livingston said regarding this purchase, "We have lived long, but this is the noblest work of our whole lives;" while Napoleon is quoted as saying, "I have just given to England a maritime rival that will, sooner or later, humble her pride."

LOUIS NAPOLEON. See **Napoleon III.**

LOUIS PHILIPPE (loo-ē' fe-leep'), king of France, born in Paris, Oct. 6, 1773; died at Claremont, near London, England, Aug. 26, 1850. He was the eldest son of Louis Philippe Joseph, duke of Orleans, secured a liberal education, and entered the national guard. His liberal views caused his conscription, but in 1793 he escaped to Austria, remaining an exile from France about twenty years. In the early part of his absence from France he was a teacher of mathematics and geography in Switzerland. Later he went to North America, and, after visiting various portions of the United States, he returned to England in 1800. He married Marie Amelie, daughter of Ferdinand I. of Sicily, in 1809, and in 1814 returned to Paris. Louis XVIII. and his court looked upon him with distrust, but he became highly popular with the people, and after the second restoration his vast estates were recovered from the government. Immediately after the Revolution of 1830 he was appointed lieutenant-general of the kingdom, and on August 9 of the same year became constitutional monarch of France. His policy was favorable to enlarged trade relations with foreign powers. He advocated betterment of the condition of the middle classes, the enlargement of educational facilities, and a repression of extremism in politics, all of which were conducive to the common good. However, his policies led to dissatisfaction among his opponents; several attempts were made upon his life, and in 1848 a general insurrectionary movement was inaugurated that forced him to abdicate, which he did on Feb. 24 in favor of his grandson, the count of Paris. The chamber of deputies refused to recognize the boy as king, and Louis was compelled to flee from France, spending the remainder of his life in England. His remains were taken to France in 1872, by permission of President Thiers.

LOUISVILLE (lōō'ĭs-vĭl), a large commercial and railroad city of Kentucky, in Jefferson county, on the Ohio River. It has about 2,000 manufacturing establishments that employ 25,500 persons and represent a capital of $35,500,000. Among the important products are clothing, ironware, machinery, leather, vehicles, tobacco, spirituous liquors, cured meats, and cement. The trade in whiskey and leaf-tobacco is considered the largest in the world, while its commerce in corn, pork, iron, and wheat is also important. There are extensive wharves on the Ohio River, and railway connections with the leading trade centers of America. The streets are substantially paved, contain an extensive system of street railways, and are beautified by a number of public parks. The city has a fine system of public schools, professional and business colleges, and a public library of 60,000 volumes. It has a fine county courthouse, a United States government building, and fine business blocks. In it are about 200 churches, representing all leading denominations, of which the cathedral, the Warren Memorial, and the Calvary are fine specimens of architecture. Several representative benevolent and scientific societies are maintained, making the city an important educational center. There are numerous periodicals devoted to the dissemination

of intelligence and educational arts. A bridge connects Louisville with Jeffersonville, Indiana, and another with New Albany. In size it ranks as the eighteenth city of the United States. Population, 1900, 204,731.

LOUSE, a family of small insects parasitic on and sucking the blood of animals and the juices of plants. These insects include numerous varieties; the common louse that preys on man is a well-known species. It has a suctorial mouth, simple eyes, little marks of difference between the abdomen and thorax, and three pairs of legs attached to the segments of the latter. The female is oviparous, producing eggs properly called nits. In five or six days the young are hatched, and after eighteen days they are capable of reproduction. Properly there are three species of lice parasitic on man under certain circumstances: the head, or common louse; body, or clothes louse; and pubis, or crab louse. Many species of lice are parasitic on birds, bees, wasps, beetles, fishes, and plants.

LOUVAIN (lōō-văn'), a city in Belgium, situated on several railroads, about eighteen miles east of Brussels. It is on the Dyle River, and has steamboat facilities through the Louvain Canal. The city was the capital of Brabant in the 14th century, when it had a population of about 200,000. The modern city has a number of municipal facilities, an electric street railway system, several fine specimens of Gothic art, and a noted university containing a library of 250,000 volumes. This institution formerly had an attendance of 6,000 students, and at present has about 1,600. There are manufactures of machinery, spirituous liquors, cotton and woolen goods, lace, leather, and musical instruments. Its numerous parks and gardens are decorated with fine sculptures, and some of the public buildings are among the finest in Europe. Population, 40,118.

LOUVRE (lōōvr), a celebrated palace in Paris, France, situated near the Seine River. The older portion of it was a royal residence of King Dagobert in 628. Louis XIV. enlarged and beautified the building, while Napoleon I. commenced the new Louvre, and Napoleon III. completed it in 1857. The palace has several wings and galleries, all of which are distinguished for their elegance and sumptuous architecture. The more ancient part is now used as a depository for rare specimens of paintings, sculptures, and antiquities from all countries and all ages. In connection with it is also a large public library with the national archives attached. Napoleon's expedition to Egypt and the Italian campaign added many valuable treasures to the already extensive collections in the Louvre. The only works admitted to its galleries are productions of deceased artists. In 1871 the communists committed serious injury to several portions of the palace, when about 90,000 volumes of the imperial library in the Richelieu pavilion were destroyed. Baron Rothschild, in 1873, presented to the museum extensive relics discovered in the ruins of a temple of Apollo at Miletus.

LOVELACE (lŭv'lās), **Richard**, poet and dramatic writer, born in Woolwich, England, in 1618; died in 1658. He was the son of Sir William Lovelace, studied at Oxford, and in 1639 joined an expedition to Scotland. In the controversies of Charles I. he showed much fidelity to that monarch, spending his entire fortune for his interest. His writings embrace "The Scholar;" "To Althea from Prison," and "To Lucusta on Going to the Wars." His devotion to Charles I. caused him to be imprisoned at various times, and in his work entitled "To Althea from Prison" appear the familiar lines, "Stone walls do not a prison make, nor iron bars a cage."

LOW (lō), **Seth**, educator and public man, born in Brooklyn, New York, Jan. 18, 1850. He graduated from Columbia College in 1870, studied law, but soon after engaged with his father in the tea-importing business. In 1881-85 he was mayor of Brooklyn, and became president of Columbia College in 1890, where he showed marked efficiency in placing that institution on a university basis. He presented Columbia College with a library building in 1895, estimated at a value of $1,000,000. He served as a member of the Greater New York commission, and was a candidate for mayor, but was defeated, the vote being as follows: Robert A. Van Wyck, democrat, 228,531; Seth Low, independent, 148,215; and Benjamin F. Tracy, republican, 101,194. Low has been accorded distinguished honors in many educational and scientific societies. He was elected mayor of New York City in 1901.

LOWELL (lō'ĕl), an important manufacturing city of Massachusetts, situated in Middlesex county, on the Merrimac River, twenty-five miles northwest of Boston. The site of the city is hilly, and the river has a fall of thirty-three feet, thus affording splendid water power for manufacturing. The capital employed in manufactures aggregates $45,500,000, while fully 30,000 persons are employed. Its manufactures of cotton and woolen goods are among the most important of the world. It also has vast manufacturing establishments producing leather, machinery, engines, hardware, patent medicine, carriages, paper, clothing, carpets, and utensils. The city is supplied with an electric street railway system that extends into rural districts and neighboring towns. It has excellent waterworks, sewerage, electric and gas lights, public parks, and a public library of 60,000 volumes. There are splendid public schools, reading rooms, and churches. The railroad facilities are extensive, connecting it with many large trade emporiums of the east and central west. It has an extensive trade in manu-

factures and merchandise. Population, 1900, 94,969.

LOWELL, James Russell, poet and diplomatist, born in Cambridge, Mass., Feb. 22, 1819; died there Aug. 12, 1891. He was the son of a Congregational minister of Boston, graduated at Harvard University in 1838, when he recited a class poem, and two years later was admitted to the bar. In 1851 he visited Europe, and again in 1855, but returned in the latter year to succeed Longfellow as professor of modern languages at Harvard. When the "Atlantic Monthly" was established, in 1857, he became its editor, a post filled successfully for six years, and then he became connected for ten years with the "North American Review." Lowell took naturally to literature from the early years of his life, his first publication appearing in 1841, entitled "A Year's Life and Other Poems." In 1844 he issued a second volume of poetry, and the next year published "Conversation on Some of the Old Poets," a book now out of print, but interesting because the young student showed marked enthusiasm in a channel wholly neglected in America, and intimating a line of thought and study in which he afterward made most noteworthy ventures. In 1848 he published another volume of poems, and in the same year appeared the "Vision of Sir Launfal." The "Biglow Papers" was published in 1846. It comprises a work directed against the Mexican War and slavery, and caused the young author to be read extensively. A second series of "Biglow Papers" appeared while the war for the Union was progressing, in which wit is mingled with a deep strain of feeling and a large tone of patriotism. In 1877 he was appointed minister to Spain by President Hayes, from which he was transferred to England in 1880, but his duties in these positions did not deter him from producing occasional writings. His works of that period are chiefly in touch with political events; notable among them is an address at the unveiling of a statue of Fielding and his address on "Democracy." In 1885 he returned to the United States and devoted the closing years of his life to literary work. Among his writings not mentioned above are "Fable for Critics;" "Among My Books;" "Commemoration Ode;" "My Study Windows;" "Under the Willows;" "Memorial Poems;" "Fireside Travels;" "The Pioneer;" "Political Addresses," and a collection of later poems, entitled "Hearts-ease and Rue." His complete works were revised in 1890 and published in ten volumes.

JAMES RUSSELL LOWELL.

LOYALTY ISLANDS, a group of islands in the South Pacific, situated sixty miles east of New Caledonia, and belonging to France. They are of coral formation and have a level surface. Among the products are cotton, cereals, live-stock, and tropical fruits. The most important islands of the group include Lifu, Uvea, Toka, and Mari. The total area is 840 square miles, and the population 15,165.

LOYOLA (loi-o'la), **Ignatius de,** theologian, born near Azpeitia, Spain, in 1491; died in Rome, Italy, July 31, 1556. He became a page to King Ferdinand at the age of fourteen, but soon after entered the army, and distinguished himself in 1521 while defending Pampeluna against the French, where he was severely wounded, taken prisoner, and held by the French in confinement for a long time. During this period he spent much time in reading books devoted to religious topics, and gave particular attention to a volume of the "Life of the Saints." Being greatly impressed by its spiritual admonitions, he resolved to renounce the world and devote his energies to the Christian cause. In 1522 he took the vow, soon after visited Rome and Jerusalem, and in 1524-27 studied at Barcelona, Alcala, and Salamanca. The following year he began a seven years' course of training in theology at Paris, and in 1534 founded the Order of the Jesuits. In 1540 the order was confirmed with certain limitations by Pope Paul III., and Loyola made Rome his headquarters for the superintendence of the society. Paul V. beatified him in 1607, and Gregory XV. canonized him in 1622. The Roman Catholic colonists of Maryland chose him as patron saint of the colony. His festival occurs on July 31.

LOYSON (lwä-zôn'), **Charles,** also known by his monastic name, Pere Hyacinthe, eminent divine, born in Orleans, France, March 10, 1827. He took a course of instruction in theology at St. Sulpice, Paris, was ordained priest in 1851, and engaged to teach philosophy and theology at Avignon and Nantes. Subsequently he attracted large congregations as a Carmelite minister at Paris, all classes of people coming to hear him in his boldness and eloquence, but in 1869 he was silenced by an order for denouncing abuses in the church. To this he replied in an open letter, for which he was excommunicated, and in 1869 visited in the United States. About the same time he assumed his family name, Loyson, married an American lady at London, in 1872, and in 1879 established a congregation at Paris independent of the Catholic Church. Besides publishing a number of works on religious themes, he made public several volumes of lectures and sermons.

LUBBOCK (lŭb'ŏk), **Sir John,** banker, scientist and parliamentarian, born in London, England, April 30, 1834. After taking

an elementary course of study, he entered his father's banking house at the age of fourteen and became a partner in 1856. In 1870 he entered parliament, was elected for London University in 1886, and is noted as an advocate of financial and educational reform. From 1872 to 1880 he served as vice-chancellor of the University of London, became president of the British Association for the Advancement of Science in 1881, and held other distinguished positions. His writings include important works on a wide range of subjects, those relating to insects and plants being of especial value. Among his principal works are "Races of the British Isles;" "Fifty Years of Science;" "Origin and Metamorphosis of Insects;" "Ants, Bees and Wasps;" "Flowers, Fruit and Leaves;" "Contribution to the Knowledge of Seedlings;" "Pleasures of Life;" "Scenery of Scotland," and "Senses, Instinct and Intelligence of Animals."

JOHN LUBBOCK.

LUBECK (lü'bĕk), an important free city of Germany, on the Trave River, thirty-five miles northeast of Hamburg. The Saxons founded it in 1143, and, on account of important privileges granted by the German emperors, it rose rapidly to commercial importance, being for many years at the head of the Hanseatic League. Frederick II. made it an imperial free city as early as 1226. The French captured it in 1806 and annexed it in 1810, but in 1813 it recovered independence, and is now a constituent part of the German Empire. The city is connected extensively by railroads, has beautifully paved streets, electric street railway lines, telephones, a fine public school system, and several important educational institutions. It is the seat of many hospitals and contains the Rathhaus, in which the deputies of the Hanseatic League held their meetings. The manufactures embrace cotton and woolen goods, ironware, spirituous liquors, clothing, textiles, cigars, ships, and engines. It has an extensive import and export trade, especially in fish, cereals, livestock, and merchandise. The Trave River has been deepened so as to permit the largest vessels to reach the city, though its harbor properly is at Travemunde, sixteen miles down the river. There are splendid benevolent institutions, churches, parks, and bathing places. Fully ninety-eight per cent. of the people are Protestants. The area belonging to the city is 115 square miles, on which is a population of 95,760, while the population of the city proper is 69,980.

LUBLIN (lōō'blĭn), a city of Russian Poland, sixty miles southeast of Warsaw, on the Bistrzyca River. It is the capital of the government of Lublin. The city has excellent railroad facilities, good schools, and a large trade. Among the chief manufactures are cotton and woolen goods, soap, machinery, and hardware. Many of the inhabitants are Jews. Population, 49,875.

LUCCA (lōōk'kä), a city of Italy, capital of a province of the same name, situated on a railway line, thirteen miles northeast of Pisa. In the surrounding country are fine farms and orchards, and silk culture is an important enterprise. There are manufactures of stucco, silk, musical instruments, and machinery. The surrounding country is noted for its production of silk and olive oil. It has a large trade in silk goods, olive oil, fruits, and cereals. The city has several fine churches, among them the Cathedral of St. Martin, begun in 1063, and a number of fine educational institutions. The province of Lucca was made a principality by Napoleon, though it later passed to Spain, and in 1847 was ceded to Tuscany. Population, 22,500.

LUCERNE (lōō-sẽrn'), a deep-rooting perennial plant, clover-like in appearance, and cultivated extensively for fodder. It is native to the southern parts of Europe, but has been naturalized extensively in America and other grand divisions. The plant attains a height of from twelve to fourteen inches, growing quickly after being mown. It supplies forage early in the season, and is especially valuable in its ability to endure great droughts, causing it to be cultivated to a considerable extent in arid regions.

LUCERNE, a city of Switzerland, capital of the canton of Lucerne, at the northwest extremity of Lake Lucerne, on the Reuss River. It has good railroad connections, modern municipal facilities and a number of excellent buildings. Among the manufactures are cotton, woolen, linen, and silk fabrics, gloves, carriages, musical instruments, and machinery. As a gathering place of summer visitors and tourists it takes high rank, owing largely to its interesting scenery, including the Lucerne Lion, a figure of a lion hewn in 1821 from the solid rock after a model furnished by Thorwaldsen; the Glacier Garden, containing formations caused by the action of ice; and many scenic views in connection with the lake region. The city has a number of fine churches, public parks, and an excellent library. Population, 22,940.

LUCERNE, Lake of, known also Lake of the Four Forest Cantons, a lake of Switzerland, surrounded by the cantons of Unterwalden, Schwyz, Lucerne, and Uri. Its surface is 1,400 feet above sea-level. The shores are rocky and precipitous, the general form irregular, and the scenery, as well as its historical associations, have been celebrated for many centuries. The length

of the lake is about twenty-two miles, breadth two miles, and area forty-four square miles. Steamboats navigate it, making it important commercially. On its shore are many harbors and beautiful villas. Near it are several important cities. Many of the early historical associations are connected with the name of William Tell.

LUCIA, St., a West Indian island belonging to the British. It has much fertility, exports cocoa, sugar, rum, and tropical fruits, and contains a population of 46,375. Castries is the capital; population. 3,630.

LUCIAN (lū'shạn), Greek author, born in Samosata, Syria, in 120 A. D.; died in Egypt about 198. He descended from poor parents, studied law and Greek letters, and traveled extensively in Italy, Greece, and Gaul. At Athens he became acquainted with the Attic dialect. It is thought that he wrote many of his satires while residing at Athens, but in the latter part of his life he served as procurator of part of Egypt under appointment of Emperor Commodus. His writings are humorous and satirical, by some considered of an impious nature, and showed a powerful inventive fancy. The list of writings embrace "Dialogues;" "Criticisms;" "Biographies;" "Romances;" "Poems," and rhetorical and miscellaneous works. His best known works are the so-called "Dialogues," which are devoted to the ridicule of philosophical sects and mythology, and embrace principally "Dialogues of the Gods and of the Dead;" "Sale of Lives;" "Above the Clouds;" "True Histories," and "The Revivified."

LUCIFER (lū'sĭ-fẽr), an ancient name of Venus, appled when it was the morning star, as distinguished from Hesperus, the name given to it when it was an evening luminary. Early commentators mistook the reference made in Isaiah xiv, 12, to the kings of Babylon, and ascribed the appellation to Satan. Lucifer is the name applied in Milton's "Paradise Lost" to the archangel who fell from divine favor and lowered a part of the host of heaven to the infernal regions.

LUCKNOW (lŭk'now), an important city of British India, capital of the province of Oude, on the Gumti River, forty-two miles northeast of Cawnpore. It is surpassed in population only by Calcutta, Madras, and Bombay. The city has extensive railroad facilities, connecting it with all parts of India, and is the seat of a vast trade in farm produce and merchandise. Its history dates back to the earliest periods of authentic data. The older part of the city has low houses constructed of mud and straw roofs. In the newer portions are many fine streets and numerous religious, educational, and government buildings. It is improved by divers modern municipal facilities, such as telephones, waterworks, sewerage, and electric street railways. In 1857 it was the center of activities during the Sepoy mutiny, and its garrison was besieged by a large army of natives. In making the defense Sir Henry Wallace was slain, General Havelock died of dysentery, and permanent relief was not secured until in 1858, when Sir Colin Campbell entered the city with an English force and put an end to the mutiny. The Gumti River is navigable to Lucknow at all seasons. Population, 274,650.

LUCRETIUS (lu-kree'shĭ-us), **Titus Lucretius Carus**, Roman philosopher and poet, born about 95 B. C.; died in 52 B. C. His life is shrouded in tradition, but it is known that he was one of the most noted descriptive poets of Rome. His reputation rests largely on his celebrated work in six books, entitled "On the Nature of Things." It constitutes a philosophical didactic poem, was published about 56 B. C., and in it are explained the tenets of the writer in relation to morals, religion, and physical life. It was his ambition to destroy the superstition of his countrymen, and to direct their attention to the fixed laws that govern the universe and hold together all matter of which it is constituted. He called attention to his theories in public discourses, maintaining that the senses are the avenues by which knowledge is obtained, and that they constitute the most reliable means of testing truth; that natural causes are the occasion of all phenomena, and thus superstition is but the outgrowth of ignorance and weakness; that the world was created from existing materials, and that its destruction is impossible, though its existing form may not endure; and that the functions of the body include life and soul, both of which cease when the body perishes. His work is valuable as a production of art, but as a philosophical speculation it is rather vague than reliable. Many editions of the works of Lucretius have been published.

LUCULLUS (lū-kŭl'ŭs), **Lucius Lucinius**, distinguished naval and military commander of Rome, born about 110 B. C.; died about 56 B. C. In 77 B. C. he was prætor of the province of Africa, became consul the following year, and shortly after reaching Asia he defeated the king of Pontus, Mithridates, at Chalcedon. The entire regions of Pontus were subdued by the Romans in 71 B. C., and two years later Lucullus conquered Armenia, making its king, Tigranes, tributary to Rome. A mutiny was organized by Mithridates and Tigranes in the year 68 B. C., and, failing to subdue the rising forces, Lucullus was superseded by Pompey. He acquired a large fortune during his public life, much of which he spent in encouraging philosophers, poets, and artists, and he also established splendid gardens. His practice was such that he came to be spoken of as a lover of justice and humanity. During the time of his military power he bent every energy to overcome the evils of the first triumvirate, constituted of Crassus, Pompey, and Cæsar.

LUDINGTON (lŭd'ĭng-tŏn), a city in Michigan, county seat of Mason county, on Lake Michigan, where it is entered by the Pere Marquette River. It is well connected by steamboat and railway lines, giving it extensive trade advantages. The surrounding country is rich in the production of fruits, salt, and lumber. There are manufactures of ironware, carriages, cigars, lumber products, furniture, and machinery. The city has modern facilities, including electric lights, waterworks, and sewerage. It is the seat of fine schools and churches. Population, 1904, 7,259.

LUDWIG I. (lōōd'wig), or **Louis le Debonnaire**, born in 778; died on an island in the Rhine, near Mentz, June 20, 840. He was the son of Charlemagne, becoming his co-regent in 813, and in 814 succeeded him as emperor of the West and king of the Franks. Being anxious to establish an order of succession, he declared his eldest son, Lothaire (796-855), his successor in 817, giving him the greater part of Germany, and also placed his other sons, Pepin and Louis, in charge of vast dominions. Bernard, king of Italy, was dissatisfied with the partition and raised an insurrection, but he was soon overcome and his territory annexed to that of Lothaire. In 829 he made a second division at the request of his second wife, Judith of Bavaria, on account of which her son received a representative share of the territory, but the three older sons refused to consent, and accordingly met their father in battle near Colmar in 833. The result proved unfavorable to Ludwig, and he voluntarily abdicated. Pepin died in 838, when the principal part of the dominion fell to Charles and Lothaire. This circumstance caused the younger Louis, son of Ludwig's second wife, to object, but Ludwig died before the dispute was settled. Lothaire I. succeeded to the imperial title, but all the sons received dominions of more or less importance.

LUDWIG I., Karl August, king of Bavaria, born Aug. 25, 1786; died in 1868. He secured the advantages of a liberal education, was a devoted patron of science and fine arts, and on Oct. 13, 1825, succeeded to the throne. His reign was inaugurated by encouraging fine arts and erecting public buildings. In religious affairs he was partial to the Church of Rome. He gave support to the first railway built in Germany, a line from Furth to Nuremberg, and also constructed the Ludwigskanal, a canal uniting the Main and Danube. The revolutionary movements in 1848 caused him to resign in favor of his son, Maximilian.

LUINI (loo-ee'nee), or **Luvino, Bernardino**, eminent painter of Lombardy, born at Luino, Italy, in 1470; died about 1530. He is noted as one of the most celebrated artists of the Lombard school, his productions being characterized by poetic grace, excellent coloring, and great beauty. Among his pictures are several frescoes in oil, including "St. John with the Lamb;" "The Crucifixion," and "The Enthroned Madonna."

LUKE, St., a Christian evangelist, author of the third gospel and of the Acts of the Apostles. It is thought that he descended from a Hellenic Jew, was born at Antioch in Syria, and studied and taught medical science. The Scriptures refer to him as an associate of Paul, whom he accompanied in 52 A. D. on his second evangelistic expedition, and he himself states at the beginning of his gospel that his information came from those who were eye-witnesses and ministers of the Word from the beginning. From this is implied that he was not an eye-witness of the events, but that he recorded them from those closely associated with Jesus and the disciples. It is not certain when he was converted, but it is thought that he was included with the seventy disciples who were sent forth by Jesus to preach, and that he was the person whose name is not mentioned in speaking of the Saviour's journey to Emmaus. In the Acts of the Apostles incidents are related to which he was an eye-witness while accompanying Paul in his travels. Jerome places his age at eighty-four years, but neither the time of his birth nor death is known. October 18 is generally celebrated as his festival.

LUMBAGO (lŭm-bā'gō), the form of rheumatism that affects the muscles of the loins. It sometimes extends to the ligaments underneath the muscles, and often occasions sudden and severe pain to the person afflicted.

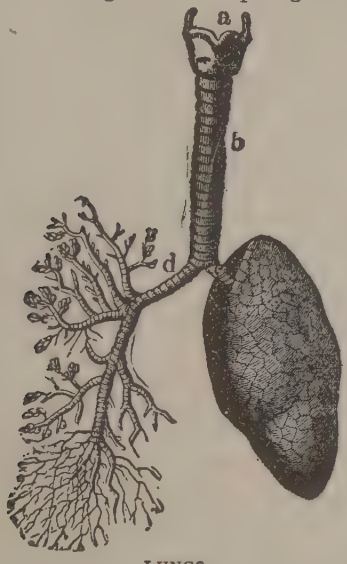
LUNACY (lū'nà-sy), a term applied to persons born sane, but who have from some cause fallen into temporary or permanent aberration of intellect. Lunatics possess a brain of so little circumference that they are never capable of exercising much reason. Lunacy is distinguished from idiocy in that the latter is a designation of persons born with unsoundness of mind. See **Insanity**.

LUNAR THEORY, the deduction of the moon's motion from the law of gravitation, manifested in the attraction of the sun and planets.

LUNDY'S LANE, the seat of an important battle near Niagara Falls, in Canada, fought in the War of 1812. The British had been defeated at Chippewa and General Drummond was sent forward to meet the Americans under Gen. Jacob Brown, but the latter dispatched General Scott to menace the forts on the Niagara River. On July 24, 1814, General Scott came in contact with the British forces under General Riall on a hill near Lundy's Lane, and sent Major Jesup forward to make a flank movement at the British rear, while Scott engaged the enemy. Action continued from the middle of the afternoon till midnight, the British troops being everywhere repulsed, but the American generals, Scott and Brown, were wounded, when the command devolved upon General Ripley. The latter withdrew from the field,

and it was again possessed by the British on the following day. The Americans lost 850 men, while the British loss was near 900.

LUNGS, the organs for aërial respiration, situated in the thorax, on each side of the heart. In man the lungs are conical, with the base resting on the diaphragm and the



LUNGS.

a, larynx; *b*, trachea; *c*, *d*, bronchial tubes.

trachea extending above the collar bone. There are two lobes, separated by a deep fissure, the right being somewhat larger on account of having a third lobe of triangular shape above, and also because the heart lies toward the left side. The lungs are composed of honeycomb-like cells to which air passes by means of the bronchial tubes, these being formed by divisions of the trachea, and at the upper part of the trachea is the larynx. Within the lungs also are ramifications of the pulmonary artery and veins, bronchial arteries and veins, lymphatics, and nerves; the whole being bound together by fibrous tissue. Each lung is enclosed in a serous membrane, the pleura, which extends to its roots, and is then expanded on the chest wall. All mammals, reptiles, birds, and some amphibians possess lungs, while in the lowest and simplest forms of animal life there are no traces of respiratory organs, equivalent action taking place by cilia or by the general movement of the body. Most mollusks possess gills in the place of lungs. Fishes sustain life by gills, though many have an air-bladder; while animals approaching reptiles in form have a well developed sac, and in many of them it takes on a double form analogous to the double lung.

The important function of the lungs is to bring the blood in contact with the air for the purpose of purifying it. In this process the air gives up its oxygen to the blood in the delicate cells in the lungs, and in turn receives water and carbonic acid gas that have become foul with waste matter, accumulated by the blood in circulating through the body. The air exhaled carries off these impurities, while the purified blood bounds through the system and carries the inspiring oxygen to the different organs. Several acute and chronic diseases affect the lungs, among them pneumonia, a form of inflammation, and consumption. See **Respiration.**

LURAY (lū-rā'), county seat of Page county, Virginia, situated in a fertile valley of the South Fork of the Shenandoah, seventy-seven miles west of Washington. It contains woolen factories, mills, a tannery, an academy, and two seminaries. Near it is the celebrated Luray Cave, remarkable for its peculiar stalactites, many of which are fifty feet long. There are hundreds of lakes in the cave, varying in size from a few to fifty feet in diameter, and from six to fifteen feet in depth. The exact size of the cave is not known, but there are various chambers of large size and irregular outline, many of them having a height of 260 feet. Its temperature is uniformly 54° Fahr., the air pure, and portions are lighted by electricity, thus forming a favorite attraction for thousands of visitors annually. The population of Luray, in 1900, was 1,146.

LUTE, a stringed musical instrument somewhat resembling a guitar, and of general popularity in Europe during past centuries. It was introduced into western Europe by the Arabians, who used it in the performance of solos and duets, and for accompaniments. Its antiquity is attested by representations on Egyptian tombs and sculpture. Originally the lute had five or six pairs of strings, each pair tuned in unison or octave, but later the strings were increased to twenty-four in order to accommodate the lute to the chromatic scale. The music is produced by striking the strings with the fingers of the right hand, and with those of the left stopping them on the frets.

LUTHER, Martin, the most eminent Protestant reformer, born at Eisleben, Germany, Nov. 10, 1483; died there Feb. 18, 1546. He descended from a family of free peasants, was the son of Hans Luther and Margaret Lindeburn, and secured his elementary education at Magdeburg and Eisenach. While attending school in the latter town, he attracted the notice of a lady named Ursula Cotta, wife of the burgomaster, who gave him motherly care and a comfortable home. In 1501 he entered the University of Erfurt, where he studied classics and philosophy, and secured a master's degree in 1505. While at Erfurt he was impressed by examining the Vulgate translation of the Bible in the university library. After studying and comparing it carefully with lexicons, he resolved to devote himself to a spiritual life, and soon after entered the

Augustine Convent at Erfurt. There he remained three years studying the Bible, and formed the doctrinal convictions which afterward strengthened him in his struggle against the papacy.

MARTIN LUTHER.

Luther was ordained a priest in the Roman Catholic Church in 1507; became teacher in the University of Wittenberg, founded by the elector Frederick of Saxony, and became a bachelor of theology in 1509, at which time he began to lecture and discourse on the Scriptures. The sermons he preached were so powerful that they awakened much enthusiasm, and of them Melanchthon said they were "born not on his lips, but in his soul." In 1510 he proceeded on a mission to Rome on business with Pope Leo X., but had no open controversy with the Catholic Church until John Tetzel came to Wittenberg, in 1517, for the purpose of selling indulgences for the commitment of sins. This course caused him to prepare ninety-five propositions, or theses, in opposition to the doctrine of indulgence, which he nailed to the door of the church at Wittenberg, and proposed to defend them in the university. The theses denied the pope all right to forgive sins, and maintained that papal absolution has no value in and of itself. The bold position taken by Luther caused Tetzel to flee, and a great wave of religious commotion spread over all Germany.

All efforts to cause Luther to retract were of no avail. He refused to proceed to Rome on a summons, and gave no heed to the entreaties of Cardinal Cajetan for a reconciliation. In 1519 he entered a public disputation with Dr. Eck, and the next year publicly burned a bull of anathema sent by the pope to Wittenberg. Being called upon to vindicate his conduct, he issued his famous address to the "Christian Nobles of Germany," and many of the most powerful immediately rallied to his support. Charles V. became emperor of Germany at that time, and convened his first diet of sovereigns at Worms in 1521, to which Luther was summoned with the view that he would recant. He at once declared his readiness to appear before the diet. His journey resembled a march of triumph, friends rallying to his support and enemies threatening him. He declared his readiness to appear at Worms even though as many devils confronted him as there were tiles on the roofs of the city. At the diet he acknowledged his writings, but refused to retract unless convinced by Scripture and reason, declaring it unsafe and unjust for man to stand against conscience. The closing words of his masterful plea were, "There I take my stand; I can do no otherwise; so help me, God." Frederick the elector of Saxony sent a troop of soldiers to conduct him safely from Worms after his triumph, and he was secluded for about a year at the castle of Wartburg, where he devoted his time to translating the New Testament into the German.

The fires of the Reformation were kindling with rapidity, and soon after he left for Wittenberg, where he counselled peace and solicited moderation on the part of the princes and nobles. In 1525 he and Erasmus differed on several Christian tenets, which resulted in the publication of a number of treatises. In the same year Luther laid aside the priestly robe of the Roman Church and married Catherina von Bora, a nun, who, with several others, had renounced Catholicism under Luther's teachings. The work of translating the Bible into the German was completed by the aid of Malanchthon and others in 1534, and the Confession of Augsburg was made in 1530, two works of importance; the former serving to unify and extend the German language, while the latter established the Protestant faith in Germany and many other countries of Europe. Luther was a thoroughly practical man, in whom were combined rare humor, tenderness, and poetic sensibility. Surpassed by Melanchthon in judgment and by Calvin in learning, he was yet a reformer rarely equaled in power of discourse and religious zeal. The writings of Luther are very numerous, and include sermons, treatises on Scripture, songs, letters, and table talks. His best known song is "A Mighty Stronghold is Our God."

LUTHERANS (lū'thĕr-ans), a body of Christians that adopted the principles of Martin Luther, and who constitute numerically the largest Protestant organization in the world. The two principal branches are designated as Evangelical and Reformed, the former holding exclusively to the teachings of Luther, while the latter constitute a branch separated from the main body under Calvin. The largest number of adherents to Lutheran tenets are in Germany, Sweden, the United States, Holland, Switzerland, Austria, Norway, Denmark, and Russia, but there are branch organizations in all parts of the civilixed world. The first Lutheran immigrants to the United States came from Holland and settled at New Amsterdam in 1624. Large numbers came from Sweden in 1637, from Germany in 1680, and Switzerland in 1734. At present there are 7,500 ministers of the Lutheran Church in the United States, and 12,550 churches, while the Lutheran population is estimated at 6,785,950. They maintain 120 institutions of higher learning, support extensive missionary operations, and are grouped in sixteen independent synods. Among the important societies are the Luther League, Women's Societies,

Walther League, and Christian Endeavor Associations. The chief Lutheran institutions in America are in St. Louis, Missouri; Fort Wayne, Indiana; Springfield, Illinois; St. Paul, Minnesota; Milwaukee, Wisconsin; and Neperan, New York.

LUTZEN (lo͝ot'sẹn), a town of Germany, in Prussian Saxony, celebrated because of two historic battles fought within its proximity. The first was between the Swedes under Gustavus Adolphus and the imperialists under Wallenstein in 1632, in which the former were victorious. The other occurred between the allied German and Russian forces against Napoleon on May 2, 1813, in which the victory was claimed on both sides. In this battle the French lost 12,000 men and the allies 10,000.

LUXEMBURG (lŭks'ĕm-bûrg), a grand duchy of Europe, surrounded by Germany, France, and Belgium. It was under the sovereignty of King William III. of Prussia until his death in 1888, when it passed to Adolph, duke of Nassau. The area is 998 square miles and the population 243,175. Luxemburg is the capital, a city of 31,225 inhabitants. The soil is fertile and well adapted to agriculture. Its drainage is largely by a number of streams into the Moselle. The government is constitutional, the duke being assisted by a chamber of deputies of forty-five members chosen by direct vote. For commercial purposes it is united with the German Zollverein. The language is German and the religion largely Catholic.

LUZON (lo͞o-zo͞n'), the largest and most important island of the Philippines. It has a fertile soil, vast forests of valuable timber, and is traversed by a number of mountain ranges. The general contour is very irregular, especially in the southern part, where are many important bays and excellent harbors. Among the principal lakes are Bai, Taal, and Caxaren. The chief streams are the Pampamga, Agno, Abra, and Cagayan rivers. It has extensive productions of manila hemp, rice, sugar, tobacco, ginger, coffee, pepper, and many varieties of fruits. The domestic animals include cattle, horses, buffalo, sheep, and swine. Several railway lines are operated, connecting Manila, the capital, with interior and coast points. The population, including several adjacent islands, is 3,432,424. See **Philippines.**

LYCURGUS (lī-kûr'gus), a celebrated law-giver of Sparta, son of King Eunomus. According to Herodotus he flourished about 890 B. C. He was an uncle of Charilaos, who became king in his infancy, under the guardianship of Lycurgus. When his nephew became of age, Lycurgus went upon an extended tour through Crete, Asia Minor, Libya, Egypt, India, and Iberia for the purpose of examining political institutions and studying economic conditions. On his return to Sparta he became recognized as an efficient law-giver, writing for the Spartans a new constitution. His constitution was designed for the purpose of establishing the Spartan government as a powerful nation, one in which the public good should be the highest concern of legislators, and private interests be subservient to it. After adopting the constitution, he required the Spartans to vow that it would not be changed until his return from a second journey, hoping thereby to make it perpetual and to overcome any possibility of its early repeal. It is recorded in history that he never returned, but Lucian furnishes good evidences that he retired from public life and died at the age of eighty-five years. The Spartans held Lycurgus in high esteem, and perpetuated his memory by the erection of a temple and the offering of annual sacrifices.

LYDDITE, a modern high explosive, so named from its manufacture at Lydd, Wales, where the first experiments were made with it. The first use of lyddite in warfare was by the British in the war with the Boers in 1899-01. Its method of manufacture has been kept a secret, but it is thought to consist of picric acid brought to a dense form by fusion and poured into shells in a liquid state. Though formerly restricted in use to five-inch howitzer guns, it is now employed in the larger fort and naval ordnance. When fired, the picric acid causes a dense fume of yellowish-green gas, and it is somewhat objectionable on account of requiring a primer.

LYDIA, an ancient country of Asia Minor, surrounded by Phrygia, Mysia, Ionia, and Caria, and originally inhabited by a people called Mæonians. About 720 B. C. the Lydians occupied the country and developed a large interior commerce. Their greatest prosperity was reached in the period included between the years 716 B. C. and 546 B. C.; their king Crœsus was conquered in the latter year by Cyrus of Persia. It is claimed that the Lydians were the inventors of musical instruments, coined money, and wool dyeing, and that they discovered the art of working in ore. Sardis was the capital, and after the Persian invasion became the seat of government of the western part of the empire, remaining such until its conquest by the Athenians.

LYELL (lī'ẹl), **Sir Charles**, geologist, born at Kinnordy, England, Nov. 14, 1797; died Feb. 22, 1875. He was the eldest son of Charles Lyell, studied at Midhurst and Exeter College, Oxford, graduating from the latter in 1819. Subsequently he studied law, but soon became devoted to researches in geology, to which he gave many years of study. In 1824 he made a tour of Europe to study geology, and subsequently several others, visiting the United States and other American countries. His "Principles of Geology" was published in 1830. He became professor of geology at King's College in 1832, was president of the Geological Society in 1836, and about the same time received a

degree from Cambridge. He was made a baronet in 1864. His principal writings include "Elements of Geology;" "Antiquity of Man;" "First and Second Visits to North America," and "Transactions of the Geological Society." He promulgated the view that the antiquity of man is much greater than was formerly believed, supported the doctrine of evolution, and molded a decided taste favorable to scientific research.

LYMPHATIC SYSTEM, the system in animals that absorbs lymph from the various organs and tissues, and conveys it by the lymphatic vessels toward the heart. It includes the lymphatic vessels, the glands, and the lacteals. The lymphatic vessels are delicate tubes of nearly uniform size, have a knotty appearance, and occur in every texture and organ of the body. Lymphatic glands vary in size from a hemp-seed to an almond, are round and oval in form, and are made up of adenoid tissue. They occur in the course of the lymphatic vessels and the lacteals, and may be noticed particularly near the large blood vessels, in the armpits, and in the neck. The lymph is a clear, colorless, alkaline fluid, consisting of a plasma resembling that of the blood and of corpuscles like the white blood-corpuscles. After being absorbed from the different tissues and organs, it is conducted to the general blood current. The lymphatics of the right thorax, the right arm and the right side and neck convey their contents to the right lymphatic duct, and those of the rest of the body into the thoracic duct. The lacteals serve to absorb chyle from the small intestines, which is elaborated in the lymphatic glands, and afterward carried to the thoracic duct. The important function of the system is to retain and elaborate portions of the waste matter of the body and render them suitable for further use. They likewise absorb the poison of disease, produce the phenomena of absorption of the skin, and after nature deposits an excess of matter to fill up the breach in a wound it is largely removed to other parts of the body. Hibernating animals are supported during the winter by the fat which the absorbents carry into the circulation from the extra supply accumulated during the summer. In sickness a man unconsciously consumes his own flesh through the activity of the lymphatics.

LYNCHBURG (lĭnch'bûrg), a city of Virginia, in Campbell county, on the James River, ninety miles west of Richmond. It is surrounded by a fertile agricultural country. The city has a fine public school system, electric lights and street railways, waterworks, pavements, and a fine public library. It is the seat of Randolph-Macon College. Among its buildings are a modern county courthouse, an orphanage, and many fine churches. The manufactures embrace furniture, tobacco, ironware, flour, lumber, products, machinery, cotton goods, and utensils. There is an abundant water power. The city has a large commercial trade in merchandise. Population, 1900, 18,891.

LYNCH LAW, the summary infliction of punishment by an informal and self-appointed body of men who act as an extemporized court. It is used to designate such punishment either with no trial at all or after trial by a court of law. The term is thought to have originated from James Lynch, mayor of Galway, Ireland, who sentenced his son to death for murder about 1526, and to prevent a rescue by a band of men executed him by his own hands without due process of law. The term became of common application in the United States from a Virginia planter named Charles Lynch, who acted with a number of associates to punish summarily tories and British sympathizers. Lynch-law executions in the United States are about twice as numerous as legal ones.

LYNDHURST (lĭnd'hûrst), **John Singleton Copley,** lawyer and statesman, born in Boston, Mass., May 21, 1772; died in London, Oct. 12, 1863. He was the son of J. S. Copley, who removed from Boston to London in 1775, and gave his son a liberal education at Chiswick and Cambridge. The latter was called to the bar in 1804, built up an extensive practice, and entered parliament in 1818. Subsequently he was solicitor-general, attorney-general, and in 1831 became lord chief baron of the exchequer. He was chosen lord chancellor for a third time in 1841, a position he held until 1846, when the Peel administration was defeated. Lyndhurst was not only an able jurist, but possessed recognized ability as an orator and diplomatist. His last speech in the house of lords was delivered at the age of eighty-nine years.

LYNN (lĭn), an important city of Massachusetts, in Essex county, on Massachusetts Bay, ten miles northeast of Boston. It is connected by numerous railway and steamboat lines with other trade emporiums. It is the seat of 1,500 manufacturing establishments, aggregating a capital of $15,900,000, and devoted principally to the production of shoes, electric apparatus, machinery, agricultural implements, ironware, and fabrics. The city has all modern municipal facilities, including an extensive electric street railway system, waterworks, sewerage, and a public library of 55,000 volumes. The surrounding country is rich in cereals and fruit. Population, 1900, 68,513.

LYNX (lĭnks), a genus of feline mammals, characterized by ears tufted at the tips, short tail, long fur, and comparatively long limbs. The genus includes several species, most of which are larger than the true cats, light-brown or gray in color, and are fierce and savage in preying upon poultry, sheep, and other quadrupeds. In the common lynx the body is nearly three feet long, about twenty inches high at the shoulders, and the weight is from sixteen to twenty pounds. The eyes are brilliant and the sight keen, a

fact attributed to their habit of lurking about at night. Lynxes are found in America, Eurasia, and in other grand divisions.

LYNX.

Several species are utilized in hunting, for which purpose they are domesticated.

LYON, Mary, educator, born in Buckland, Mass., Feb. 28, 1797; died at South Hadley, Mass., March 5, 1849. She possessed remarkable natural ability, acquired a good education by consecutive application, and devoted herself to teaching from 1814 to 1837. In the latter year she founded Mount Holyoke Seminary, at South Hadley, Mass., and served as its principal until her death. In this establishment there were no servants, the domestic duties being discharged by students, thus paving the way for the organization of many institutions of a similar character. Her writings include "Missionary Offering" and "Principles and System of the Mount Holyoke Seminary."

LYON, Nathaniel, soldier, born in Ashford, Conn., July 14, 1818; slain in battle Aug. 10, 1861. In 1841 he completed the course at the United States Military Academy, West Point, served in Florida during the Seminole War, and rendered efficient service in the war with Mexico, being brevetted as captain after the siege at Vera Cruz. In 1851 he served in California, where he was promoted captain, and in 1861 entered the Civil War as a Unionist. He had charge of the German troops that captured Camp Jackson, because of which he became brigadier-general, and in the same year attained success at Potosi, Dry Springs, and Wilson's Creek, in Missouri. In the latter engagement his horse was shot from under him and he was mortally wounded. Lyon was a patriotic defender of the Union, bequeathed to the United States government his whole fortune, amounting to about $30,000, for its success, and after his death his letters to political friends in relation to the Kansas troubles were published in a volume entitled "Last Political Writings of Nathaniel Lyon."

LYONS (lē-ōnz'), an important city of France, next in population to Paris, situated on the confluence of the Saone and Rhone Rivers, in the department of the Rhone. It is noted as a railroad center, has a good river port, and a large commercial trade. The municipal facilities are modern, embracing electric street railways, several parks, city waterworks, and a fine public library of 125,000 volumes. It is strongly fortified. A system of canals connects it with various trade centers, and bridges span the rivers on all the principal streets. There is a thoroughly organized public school system and several institutions of higher learning, including a Roman Catholic university. The manufactures embrace cotton, woolen, and silk goods, drugs, hats, jewelry, lace, machinery, earthenware, furniture, tobacco, and spirituous liquors. Its finest public buildings include the Church of St. Martin, a cathedral, the Gothic Church of St. Nizier, Palace de Justice, and several public buildings. Lyons was founded in the year 43 B. C. by the Romans. It became the capital of a Roman province about the beginning of the Christian era, and in the Revolution of 1789 was enthusiastic in the common cause, but suffered greatly during the conflict. It is noted as one of the fashionable centers of France. Population, 449,487.

LYONS (lī'ǫnz), **Edmund, Lord**, admiral, born in Burton, England, Nov. 21, 1790; died Nov. 23, 1858. He descended from a noted family, entered the navy as a midshipman, and won distinction by efficient service in the East Indian waters in 1810. In 1814 he became post-captain and was knighted in 1835. He was promoted to the rank of admiral in 1855, and the following year became a peer, being titled as Lord Lyons of Christ Church. His most distinguished services were against the Russians in 1853 on the Black Sea, and his command of the ship Agamemnon during the bombardment of Sebastopol in 1854.

LYONS, Gulf of, a bay on the southeastern coast of France. It receives the water from the Herault, Rhone, and Aude rivers. On its shore are excellent ports, including those of Marseilles, Toulon, and Cette. It is the seat of an active commerce. Gales are not uncommon, and owing to their fury it is said to have been named from the lion.

LYRE (līr), a stringed instrument of the harp class, used from remote times, whose origin is lost in antiquity. Its invention is ascribed to the Grecian Hermes, who is spoken of by Homer in that regard, and credited with giving it to Apollo, who was the first to play upon it with method as an accompaniment to poetry. The lyre was also used by the early Assyrians, Babylonians, Egyptians, and Semitics. At first this instrument had three strings, but the number was increased to seven, later to eleven, and finally to sixteen; this became necessary as the number of sounds cannot be greater than the number of strings. In playing the performer used a lyre-stick of polished wood or ivory, though some operated solely with the finger. The instrument has two horn-like pieces, with a crossbar at the upper ends, from which the strings are stretched to the lower parts. As a means of increasing the sound, the principal portions of the lyre are hollow. In modern times the lyre has gone largely out of use, but is still employed

by pastoral people of Eurasia and Africa. Lyric poetry was so named from the lyre, since it is the instrument used early as an accompaniment to that class of poetry.

LYRE BIRD, a genus of birds common to Australia and New South Wales. The body is not as large as that of a pheasant; the color is brownish-black above and gray-

COMMON LYRE BIRD.

ish-brown below, and they are remarkable for having sixteen tail feathers arranged in a lyre-shaped form, this peculiarity occurring only in the males. Lyre birds are shy and solitary, running rapidly at the approach of danger, and are the largest of all song birds. These birds are noted for their peculiar ability to imitate the sounds of animals and the voices of other songsters. They are fast decreasing in number, and their acclimation in countries foreign to their nativity thus far has failed. The eggs are two in number. Lyre birds feed on worms, beetles, and bugs, for which they scratch in the ground. There are only two species, known as the common lyre bird and the rasorial lyre bird.

LYRIC POETRY (lĭr'ĭk), a term applied to poems intended to be sung to the accompaniment of the lyre or harp, but now used to designate that form of poetry whose object is to give expression of thought as influenced by emotion. Among the various forms of lyric poetry are the sonnet and elegy, now not set to music, and the song, hymn, ode, and psalm, which imply a musical setting. Lyric is distinguished from epic poetry in that action is essential to the latter.

LYSANDER (lī-san'dẽr), a Spartan warrior detailed to command the fleet in 407 B. C. off the coast of Asia Minor with the design of overthrowing Athenian power and exalting that of Sparta. In 405 B. C. he attained a decided victory near Ægospotami, by which the war terminated. Being successful in every conflict, he at length undertook to overthrow the constitution of Sparta, but this was prevented by his death in the Bœotian war of 395 B. C.

LYTTON, Edward George Earle, Bulwer-Lytton, author and statesman, born in London, England, May 25, 1805; died at Torquay, Jan. 18, 1873. He was the youngest son of General Bulwer, graduated at Cambridge in 1826, and received a master's degree there in 1835. He married Rosina Wheeler in 1825 in opposition to the wishes of his mother, and, after bearing a daughter and a son, she became freed from the unhappy union. His ability as a writer manifested itself at an early age, and in 1831 he secured an election to parliament. He was reëlected in 1832, serving until 1841. The Melbourne administration made him baronet in 1835. He succeeded to the Knebworth estates on his mother's death, in 1844, and in 1852 was returned to parliament. In 1858-59 he held the position of colonial secretary. His public life was eminently successful, yet he was not a strong debater, but several of his addresses were effective and eloquent. As a writer he was prolific, thoughtful, scrutinizing, and showed mastery in plotting the construction of his themes. His first collection of miscellaneous verse was published in 1826, entitled "Weeds and

RASORIAL LYRE BIRD.

Wild Flowers." Besides contributing to the "New Monthly Magazine" and a number of other periodicals, he wrote many excellent productions. Among his works are "Pilgrims of the Rhine;" "Last Days of Pompeii;" "Rise and Fall of Athens;" "Lady of Lyons;" "Rienzi;" "England and English;"

"Duchess of La Valliere;" "Last of the Barons;" "Lucretia;" "Eugene Aram;" "Harold," and "King Arthur."

LYTTON, Edward Robert Bulwer-Lytton, Earl of, poet and statesman, born in London, England, Nov. 18, 1831; died in Paris, France, Nov. 24, 1891. He was the only son of Bulwer-Lytton, studied at Harrow and later at Bonn, Germany, and took a special course to fit himself for diplomacy. He became attached to the British legation at Washington in 1849; was transferred to Florence in 1852; The Hague in 1856; Constantinople in 1858; Vienna in 1859; Copenhagen in 1863; Athens in 1864; Lisbon in 1865; Madrid in 1868; Vienna in 1869, and Paris in 1873. In the latter year he succeeded to the baroncy of his father, became ambassador to Lisbon in 1874, and viceroy of India in 1876. Queen Victoria was proclaimed empress of India in 1877, when he directed a ceremonial celebration, and subsequently the war with Afghanistan arose. He resigned in 1880 and returned to England, when he became earl, and seven years later was made ambassador to Paris. As a writer he published largely under the name of "Owen Meredith," his productions including "Clytemnestra and Other Poems;" "Battle of the Bards;" "Lucile;" "Fables in Song;" "Legends of Exile," and "Glenaveril." In 1883 he published "Life, Letters and Literary Remains of Edward Bulwer."

M

M, the tenth consonant and thirteenth letter of the English alphabet. It has a labial and nasal articulation, and is classed among the liquids. In English it has but one sound, as in much, man, and time, but in some languages it indicates that the vowel before it is to be pronounced with nasal resonance. In the Roman notation M denotes 1,000, and when written with a dash over it ($\bar{M}$), 1,000,000.

MAB, a mythical personage made queen of the fairies by Shelley in his "Queen Mab," and also mentioned by other poets, including Ben Jonson and Shakespeare. In Shakespeare's "Romeo and Juliet" the mischievous ways of Queen Mab are described, but, according to that writer, the office of Mab properly belongs to Titania, the wife of Oberon Titania.

MACADAM (mȧk-ăd'ȧm), **John Loudon**, inventor and roadbuilder, born in Ayr, Scotland, Sept. 21, 1756; died in Moffat, Nov. 26, 1836. He spent the early part of his life in the United States, and first began to study the art of roadbuilding in 1810, when he originated the system known as macadamization. This method of building roads consists of forming a crust of broken stone and solidifying them by passing heavy rollers over the crust. The crust is from six to ten inches in thickness, this depending upon the nature of the soil. His method was adopted in England, as well as in many of the provinces, and in a number of other countries. The house of commons voted him a present of $10,000. He was also offered the honor of knighthood, but declined.

McALL MISSION, a Protestant mission instituted in France by Robert McAll in 1871, which is the largest of its kind in that country. The founder of this enterprise was born in Macclesfield, England, Dec. 17, 1821; died May 11, 1893. He was aided in the enterprise by his wife, the two visiting the laboring classes, establishing stations, and distributing literature. The workers engaged are largely French, but there are many persons of other nationalities connected with it. About $50,000 is contributed annually by the people of the United States to this enterprise.

MACARONI (măk-ȧ-rō'nĭ), an article of food composed of the dough of fine wheat flour, usually made into tubes one-eighth of an inch in diameter and about eighteen inches long. It is prepared most extensively in Italy and France, but the manufactures of the United States are steadily growing in importance. Machinery is used in the American manufactures for the purpose of kneading the dough and also for pressing it into sticks. Macaroni is sold in the market packed in boxes. It is a wholesome food, and serves in the preparation of broth, soup, and pudding.

McARTHUR, Duncan, pioneer and soldier, born in Dutchess county, New York, June 14, 1772; died near Chillicothe, Ohio, April 28, 1839. He entered the service against the Miami Indians in 1790, engaged in defenses against Indians in Kentucky and Ohio, and in 1795 settled at Chillicothe, where he acquired much landed wealth. In 1805 he became a member of the Ohio legislature, took an efficient part in the War of 1812, and in 1814 succeeded General Harrison as commander of the western army. Subsequently he concluded a treaty of peace with the Indians, became a member and speaker of the Ohio house of representatives in 1817, and was elected to congress in 1823 as a Clay democrat. From 1830 to 1832 he was governor of Ohio. The life of McArthur is interesting on account of his daring pioneering expeditions and his efficient service, both in military and civil offices.

MACASSAR (mȧ-käs'sȧr), an important strait of the Pacific, extending a distance of 375 miles between Borneo and Celebes, and connecting the Java Sea with the Celebes Sea. It is about fifty miles wide at the northeastern point, and, as it extends toward the southwest, widens to a breadth of from one hundred to 140 miles.

MACAULAY (mā-kaw'lĭ), **Thomas Babington, Lord**, author and statesman, born at Rothley, Leicestershire, England, Oct. 25, 1800; died in London, Dec. 28, 1859. He was a grandson of the Presbyterian minister, John Macaulay, entered Cambridge in 1818, and there showed much aptitude for study and devotion to composition and debate. His career at the university was eminently successful, winning several medals, and receiving the bachelor's degree in 1822 and the master's degree in 1825. About the same time he contributed to Knight's "Quarterly Magazine," publishing in that periodical a number of productions that attracted wide attention, among them "Battle of the League;" "Armada," and "Ivry." In 1825 he contributed masterful articles on Milton to the "Edinburgh

THOMAS B. MACAULEY.

Review," and in 1830 was made a member of parliament. In his official capacity he showed himself an orator and student of political questions, but continued displaying genius as a man of literature. In 1832 he became secretary of the board of control for India, remaining in that colony until 1838, when he was again elected to parliament, holding also, in 1840, the office of war secretary and in 1846 that of paymaster-general. He continued to hold public office, with occasional lapses, with eminent success until his retirement in 1847, but was reëlected in 1852 from Edinburgh. In 1857 he became a member of the French Academy, was created a peer the same year, and at his death was taken for burial to Westminster Abbey. Macaulay was a man of splendid talent, classical scholarship, and was both accurate and fair in his historical writings. Among the productions not mentioned above are "Lays of Ancient Rome;" "Essays," and "History of England from the Accession of James II." His nephew, Sir George Otto Trevelyan, published "Life and Letters of Macaulay" in 1876.

MACAW (mȧ-kȧ'), a genus of birds native to tropical South America, remarkable for their size and the beauty of their

MACAW.

plumage. They range as far north as Mexico. The macaws belong to the parrot tribe, may be taught to articulate a few words, but have a harsh and disagreeable cry. There are a number of species designated as red and blue macaw, blue and yellow macaw, and gray-green macaw. The red and blue macaw attains a length of forty inches, the tail measuring about twenty inches. They brood twice a year.

MACBETH (mȧk-bĕth'), king of Scotland, son of Finnlaech, and succeeded to the throne in 1040. He attained the succession by defeating King Duncan. His reign of seventeen years was attended by prosperity and internal development. In 1050 he went to Rome on a pilgrimage, being the only Scottish king to undertake such an enterprise, and while there provided liberally for the poor in beneficent alms. Malcom Duncan had taken refuge in England at the time of his father's death, and in 1054 made an incursion into Scotland, but not until 1057 was Macbeth finally conquered and slain in Aberdeen. Shakespeare utilized the legends connected with the life of Macbeth, and recounts them in his work bearing that title.

MACCABEES (măk'kȧ-bēz), in Jewish history, a name applied to a patriotic family of Hebrews who resisted with remarkable patriotism the persecutions of Antiochus Epiphanes, a Syrian king. Mattathias was the original of the Maccabees, and the term became commonly applied to his descendants. It is recounted that Antiochus was expelled from Egypt by the Romans, after which he made a vigorous attempt to put down the Jewish worship. He endeavored to induce the aged Mattathias, priest of Modin, to adopt the Greek gods and the Grecian mode of offering sacrifices. The messenger sent by the king with bribes was slain by Mattathias, and he, acting with his five sons, destroyed the Grecian idols, and escaped with their possessions to the mountains. From their mountain resort they went forth periodically to restore the faith in Jehovah, but Mattathias died in 166 B. C. In the following year his son Judas gathered a number of patriots and reconquered Jerusalem, purified the temple, and instituted the Feast of Decoration, a memorial held annually in succeeding years. A Maccabean dynasty ruled over Jerusalem about a century, the last scion of the house being Hyrcanus, whom Herod the Great, slaughterer of the infants of Bethlehem, put to death, though he was the high priest and a man of great piety.

MACCABEES, Order of, a fraternal association founded in 1881, and now represented in a large number of subordinate camps. It has a total membership of 375,575.

McCARTHY (mȧk-kär'thĭ), **Justin,** author and statesman, born in Cork, Ireland, Nov. 22, 1830. After receiving a liberal education, he became a member of the editorial staff of the "Northern Times," Liverpool, in 1853, and was chosen a parliamentary reporter of the "Morning Star" in 1860. In 1868 he came to the United States, where he spent three years in traveling, and on returning to England engaged on the staff of the "London Daily News." In 1879 he was made a member of the house of commons as a representative of the home rule party, and succeeded Parnell as leader of the Irish parliamentary party in 1890. He not only took high rank as a speaker in parliament and before the people, but wrote many excellent literary productions. His writings embrace "Waterdale Neighbors;" "Comet of the Season;" "Maid of Athens;" "Donna

Quixote;" "A Fair Saxon;" "Prohibitory Legislation in the United States;" "History of the Four Georges;" "History of Our Own Times," and "Life of Sir Robert Peel."

McCLELLAN (mąk-klĕl'ąn), **George Brinton**, general, born in Philadelphia, Penn., December 3, 26; died at Orange, New Jersey, Oct. 29, 1885. His early education was by private tutors, after which he attended the University of Pennsylvania for two years, and in 1846 graduated from West Point. He served during the entire period of the Mexican War as an engineer, and attained to the rank of captain. In 1848 he was appointed instructor of engineering at West Point, was dispatched to Europe for the purpose of observing the allied armies in operation during the Crimean War, and in 1861 reported to congress in a document entitled "Armies of Europe." After 1857 he was engaged as chief engineer and as an official of the Illinois Central railroad.

GEORGE B. MCCLELLAN.

At the beginning of the Civil War Governor Dennison of Ohio appointed McClellan major-general of volunteers, and in May of the same year President Lincoln made him major-general of the department of the Ohio. He immediately moved into Virginia, forcing the Confederates to retreat from the western part of the state, and soon after a convention declared the loyalty of that portion, which was admitted into the Union as a separate state in 1862. In November, 1861, he succeeded General Scott as commander of all the armies of the United States, having previously served for a brief period as commander of the army of the Potomac. The first battle of Bull Run had demoralized the forces in the vicinity of Washington, but McClellan showed much efficiency in restoring confidence and discipline. However, he was tardy in moving upon the enemy, a fact that discouraged both the people and the president, but in March, 1862, he undertook the disastrous peninsular campaign. The seven days' battles following from June 25 to July 1 in the vicinity of Richmond, but there was an over-estimation of the enemy's strength as well as a lack of unanimity between him and the administration, both operating to lessen concerted action, and McClellan was obliged to evacuate the peninsula.

McClellan was soon after deprived of his command, a part of his forces being added to the troops under General Pope, but, after the defeat in the second battle of Bull Run, he was again put in command of this army. On Sept. 17 he commanded in the battle of Antietam, in which the Confederates under Lee were forced to retreat, but the advantages to the Union army were lost by McClellan hesitating to pursue the retreating Confederates, on account of which he was relieved of his command on Nov. 7, 1862, being then succeeded by Burnside. McClellan remained on waiting orders until 1864, when he resigned from the army, and was nominated for the presidency by the democrats. Abraham Lincoln was his opponent, receiving 2,213,665 of the popular votes and 212 electors; while McClellan received 1,802,237 popular votes and twenty-one electors, states representing eighty-one electors not voting that year. He was phenomenally popular with the army of the Potomac in spite of outside criticism. Shortly after the election he went to Europe, where he spent four years in travel and research, and, returning to New York, became engineer-in-chief of the department of docks of New York City, and in 1877 governor of New Jersey. He wrote "Manual of Bayonet Exercise;" "Organization and Campaigns of the Army of the Potomac," and "McClellan's Own Story."

McCLINTOCK (mą-klĭn'tǫk), **Sir Francis Leopold**, explorer, born in Dundalk, Ireland, in 1819. In 1831 he entered the navy, became lieutenant in 1845, and in 1848 joined the Arctic expedition sent in search of Sir John Franklin, making a similar voyage in 1849. He became commander in 1851, sailed the following year to the polar regions under Sir Edward Belcher, and in 1857 commanded an expedition fitted out by Lady Franklin, which discovered evidences of Sir John Franklin's fate. In 1884 he was made admiral. He published "Voyage in the Arctic Seas."

McCLOSKEY (mą-klŏs'kĭ), **John**, Roman Catholic priest, born in Brooklyn, New York, March 20, 1810; died in New York City, Oct. 10, 1885. He studied at St. Mary's College, Emmitsburgh, Maryland, received priest's orders in 1834, and spent two years in study at Rome, Italy. In 1837 he was made pastor of the New York St. Joseph Church, became president of Fordham College in 1841, and was consecrated bishop in 1844. He was made archbishop of New York in 1864, succeeding Archbishop Hughes, and was created cardinal in 1875, being the first American to hold that rank.

McCOOK, Alexander McDowell, general, born in Columbiana county, Ohio, April 22, 1831. In 1852 he completed the course at the West Point Military Academy, joined the United States infantry, and served against the Apaches in New Mexico, after which he was instructor at West Point in 1858-61. In 1861 he entered the Union service, was appointed colonel of the first Ohio regiment, and commanded that division of the army in the battle of Bull Run. Subsequently he commanded a division of the

army of the Ohio in the Mississippi and Tennessee campaigns, taking part in the battles of Perryville, Murfreesboro, and Chickamauga. Subsequent to the war he was mustered out of the volunteer service, became colonel in 1880, brigadier-general in 1890, and major-general in 1894. In 1896 he was one of the representatives of the president to Russia for the purpose of attending the coronation of Czar Nicholas II.

McCOOK, Daniel, general, born in Carrollton, Ohio, July 22, 1834; died July 21, 1864. He was a brother of Alexander M. McCook, graduated from the Alabama University in 1858, and began the practice of law at Leavenworth, Kansas. At the beginning of the Civil War he became captain of a local regiment, soon after was made colonel in the army of the Ohio, and was raised to the rank of colonel for distinguished service at the battle of Shiloh. He also showed bravery in the battles of Perryville, Mission Ridge, Chickamauga, and Kenesaw Mountain. While leading an assault in the last named battle was wounded on July 16, 1864, from the effects of which he died. He attained to the rank of brigadier-general.

McCOOK, Robert Latimer, general, born in New Lisbon, Ohio, Dec. 28, 1827; died near Salem, Alabama, Aug. 6, 1862. He was a brother of Alexander M. McCook, entered the Union service at the beginning of the Civil War, and distinguished himself under General Rosecrans in West Virginia in 1861. While commanding a division in General Buell's army, in 1862, he was wounded, and shortly after shot by guerrillas while lying in an ambulance. His rank was that of brigadier-general.

McCORMICK (mą-kôr'mĭk), **Cyrus Hall**, inventor, born in Walnut Grove, Virginia, Feb. 15, 1809; died in Chicago, Illinois, May 13, 1884. He was the son of a farmer and received a common school education. Subsequently he worked on a farm and in a workshop, and in 1831 invented his reaper, which was patented in 1834. Being successful in placing his machine on the market, he removed to Chicago in 1847, where he erected vast harvester works. In 1859 he made a gift of $1,000 to the McCormick Theological Seminary in Chicago, a Presbyterian institution, and later endowed a chair in Washington and Lee University, besides showing much liberality in promoting various enterprises. The entire contributions made by him and his heirs to benevolent purposes aggregate fully $1,000,000. He was shown many distinctions for his inventions, among them an official position in the Legion of Honor of France. See **Harvesting Machinery.**

McCOSH (mą-kŏsh'), **James**, educator, born in Ayrshire, Scotland, April 1, 1811; died in Princeton, New Jersey, Nov. 6, 1894. He was a son of an agriculturist, studied at Glasgow University and the University of Edinburgh, and was made pastor in 1835. In 1843 he joined the Free Church movement, and served as professor of logic and metaphysics in Queen's College, Belfast, Ireland, in 1851-68. During that time he studied the higher system of education in Germany, came to the United States in 1868, and served as president of the College of New Jersey, at Princeton, from that year till 1888, resigning in the latter year to devote himself to writing on philosophical topics. McCosh was a man of eminent ability, possessed recognized efficiency as a teacher and organizer, and his writings give evidence of marked scrutinizing power and clear statements of fact. During his college presidency at Princeton the attendance was vastly enlarged and the endowments increased to several million dollars. Among his writings are "Intuitions of the Mind Inductively Investigated;" "Laws of Discursive Thought;" "Examination of J. Stuart Mill's Philosophy;" "Realistic Philosophy Defended;" "Scottish Philosophy;" "Emotions," and a work in eight parts entitled "Philosophical Series."

MACDONALD (mäk-do-näl'), **Etienne Jacques Joseph Alexandre**, marshal of France, born at Sancerre, France, Nov. 17, 1765; died near Guise, Sept. 24, 1840. He descended from a Jacobite family, joined the army in 1784, and for distinguished services against the Prussians was made general in 1795. In 1797 he invaded Italy, where he occupied Rome and served as governor of the Papal States. Subsequently he fought at Trebbia against the Russians, and in 1800 was made commander of the army in Switzerland. As he was associated with Moreau in 1805, Napoleon did not include him as a marshal, but in 1809 he was given command of an army in Italy, and for bravery at Wagram against the Austrians was made marshal of France and duke of Taranto. The Germans under Blücher defeated him with great loss at Katzbach in 1813, but he took an efficient part in the battle at Leipsic, making his escape after the evacuation by swimming the Elster. In the campaigns of 1814 he had the utmost confidence of Napoleon, being intrusted with the important duty of carrying his abdication to Paris. He remained faithful even after all others had forsaken the great commander, and for his fidelity received the saber of Murat Bey. In 1816 he was honored with the chancellorship of the Legion of Honor, holding that position till 1831, and at his death was succeeded by his son, Alexander, as duke of Taranto.

MACDONALD (mąk-dŏn'ąld), **Flora**, heroine of Scotland, born in Milton, Hebrides Islands, in 1722; died at Peinduin, Scotland, March 4, 1780. Her father died when she was but two years of age, and she was adopted by Lady Clanranald, who provided for her education at Edinburgh. Prince Charles was defeated at Culloden, and, being disguised as Betty Burke, the "Irish-

woman," Flora conducted him from Ormiclade, in Beubecula, to Monkstadt, in Skye, and thence to Portree, where he was safely cared for by Macdonald of Kingsburgh. When this exploit was discovered, the English authorities arrested her and held her captive about a year, but her heroic bravery caused the Jacobites to accord her distinguished honors. She married Allan Macdonald of Kingsburgh in 1750, and in 1774 they emigrated to North Carolina. When the Revolution commenced, Macdonald was made a brigadier-general in the British army, but was soon captured by the colonial troops. In 1779 Flora returned to Scotland, where her husband joined her two years later, and the family settled in Kingsburgh. She is described as of fine features, medium stature and commanding presence. Her burial took place at Kilmuir, where an Iona cross of Aberdeen granite was erected over her grave in 1880.

MACDONALD, George, novelist and poet, born in Huntly, Scotland, Dec. 10, 1824. He studied at Aberdeen University and the Highbury. Independent College, London, with the intention of becoming a Congregational minister. Shortly after completing the course he secured a charge in Sussex and latter at Manchester, but subsequently gave up preaching on account of delicate health, and settled in London for the purpose of pursuing a literary course. Subsequently he went over to the church of England, preached and lectured at different times, and was particularly interested in addressing meetings of children and juveniles. In 1877 a pension of $500 was settled upon him in acknowledgment of his efficiency in contributing to literature. He lectured in the United States in 1872 and 1873, and has had a large class of readers. His more important writings include "Annals of a Quiet Neighborhood;" "St. George and St. Michael;" "What's Mine is Mine;" "Miracles of Our Lord;" "Dealing with Fairies;" "Disciples and Other Poems;" "Hope of the Gospel;" "Poetical Works," and a collection of "Essays."

MACDONALD, Sir John Alexander, Canadian statesman, born in Glasgow, Scotland, Jan. 11, 1815; died in Ottawa, Canada, June 6, 1891. He accompanied his father to Canada in 1820, settling near Kingston, and received an education in the Royal Grammar School. In 1844 he entered political life as a conservative, securing first the office of receiver-general and afterward became commissioner of lands. In 1854 he was made attorney-general, and premier in 1867, a position he held till 1873. From 1878 till his death he was the most influential leader of Canada and also premier. Among the movements claiming his support were the building of the Canadian Pacific railway, organization of the imperial federation, and vast internal improvements relating to educational and industrial arts. He received the decoration of the Grand Cross of the Bath in 1884, and Lady Macdonald was made baroness on account of her husband's public service.

McDONOUGH (mak-dŏn'o̤h), **Thomas,** naval officer, born in Newcastle, Delaware, Dec. 23, 1783; died at sea, Nov. 16, 1825. In 1800 he became a midshipman, served under Decatur in the Tripolitan War of 1803-04, and in 1807 was made lieutenant. In the War of 1812 he was in command of a squadron on Lake Champlain, where he defeated a British fleet under Captain Downie, and was awarded a gold medal by congress. He also received an estate from the legislature of Vermont. Subsequently he commanded a squadron on the Mediterranean, and died while returning from Europe.

McDOWELL, Irvin, general, born in Columbus, Ohio, Oct. 15, 1818; died in San Francisco, California, May 4, 1885. He completed an advanced course of study at the college of Troyes, France, graduated at West Point in 1838, and soon after entered service on the Canadian frontier to protect the settlements against disturbances that occurred in relation to the northeast boundary dispute. In 1841-45 he was instructor at the West Point Military Academy, but joined the army at the beginning of the Mexican War, securing a promotion to the rank of captain for gallantry at Buena Vista. Subsequently he was major at Washington, entered the Union service as brigadier-general in 1861, and was placed in command of the department of northeastern Virginia in May of the same year. He became commander of the army of the Potomac and fought against Beauregard in the battle of Bull Run, where he showed efficient service, but could not check the panic-stricken recruits in the retreat. He became commander of the re-organized army of the Potomac in 1862, and later was made major general of volunteers under command of General McClellan. He was retired from field service before 1864, but in 1865 was placed in command of the department of the Pacific, and the following year promoted to the rank of major-general. In 1882 he retired from service.

MACDUFF, a nobleman of Scotland whom Shakespeare represents as a prominent character in his play entitled "Macbeth."

McDUFFIE (mak-dŭf'ĭ), **George,** statesman, born in Columbiana county, Georgia, in 1788; died in South Carolina, March 11, 1851. After taking a general course of study, he devoted attention to law and was admitted to the bar in 1814, establishing a practice at Edgefield, South Carolina. Four years later he was elected as a democrat to the South Carolina legislature, and served in congress from 1821 to 1834, where he distinguished himself as an advocate of state rights, opposition to high protective tariff laws, and criticism of President Jackson's

administration. In 1834 he became governor of South Carolina. He retired to private life two years later, but served as United States senator from 1842 to 1846. He published "Eulogy on Robert Y. Hayne."

MACE, an aromatic spice made from the dried membranous covering of the nutmeg seed. The portion used for its manufacture is the aril or inner covering, which is fleshy, and has a crimson hue when fresh. The flavor of mace resembles that of nutmeg. It is produced chiefly in the Spice Islands, and is used principally for making pickles and in cooking. Mace is also the name of a staff of office, usually borne by officials or displayed on the table of legislative bodies as a symbol of authority.

MACEDONIA (măs-ē-dō'nĭ-a), anciently a country north of Thessaly and the Ægean Sea. Its history dates back to the year 700 B. C., when Perdiccas I., according to tradition, was the first king, but all history regarding it prior to 490 B. C. is wrapped in obscurity. In the latter year it was invaded by the Persians, and the Macedonian king, Alexander I., was required to join Xerxes in an expedition to Egypt. In the year 359 B. C. Philip II. subdued all opposition and established himself on the throne of Macedonia. His reign was successful and prosperous, and his son, Alexander the Great, strengthened the army, encouraged internal improvements, and made himself undisputed sovereign over large parts of Eurasia and Africa. At his death Macedonia lost many of its possessions under a division of the empire into four kingdoms. Soon after Greece was separated from it, and the battle of Pydna in 168 B. C. made it a province of Rome. The region is now inhabited by Wallachians, Greeks, Albanians, and Turks, and forms part of the Turkish possessions in Europe.

MACEO, Antonio, Cuban general, born near Barajagua, in Santiago de Cuba, and died from the effects of a wound received in battle on Dec. 4, 1896. He fought under Gomez during the ten years of contest for liberation, beginning in 1868, and attained to the rank of major-general of cavalry. In 1873 his efficient services led to General Weyler's defeat at Guiramo, and subsequently he took refuge in Costa Rica. It was his ambition to free Cuba from Spanish dominion, on account of which he organized a second revolution in 1888, but was compelled to flee. When Gomez succeeded, in 1895, with his project of organizing formidable opposition to the Spaniards, Maceo and his brother hastened to his assistance. His brother, Jose, was killed in battle in the spring of 1896, but Antonio fought on successfully in the province of Pinar del Rio until his death.

MACFARREN (mąk-făr'ęn), **Sir George Alexander,** musical composer, born in London, England, March 2, 1813; died Oct. 31, 1887. His musical training was secured at the Royal Academy of Music. In 1838 he became professor of harmony in that institution, was made its principal in 1875, and later became professor of music at Cambridge University. The queen knighted him in 1883. He was blind the greater portion of his life, but was assisted by his wife, who wrote his compositions from dictation. Among his principal productions are "Chevy Chase;" "May Day;" "John the Baptist;" "Charles II.;" "Robinhood;" "Don Quixote;" "King David," and a treatise entitled "Rudiments of Harmony."

MACGREGOR (mą-grĕg'ọr), **John,** canoeist and philanthropist, born in Gravesend, England, Jan. 24, 1825; died May 16, 1882. He studied at Trinity College, Dublin, and at Cambridge, graduating at the latter institution in 1847. Subsequently he traveled extensively in Eurasia and Africa, was admitted to the bar in 1851, and later made several extensive visits to the United States and Canada. Many of his travels were by canoe, and his ability as a canoeist inspired much devotion to that exercise in Britain. As a lecturer he attained eminent success, and gave funds amounting to $500,000 to education and charities. His writings were issued under the pseudonym "Rob Roy," and include "Thousand Miles in the Rob Roy Canoe;" "Rob Roy on the Baltic," and "Rob Roy on the Jordan, Nile and Red Sea."

MACHIAVELLI (mäk-e-ä-vĕl'lee), **Nicolo di Bernardo dei,** statesman and diplomatist, born in Florence, Italy, May 3, 1469; died there June 22, 1527. He was a son of Bernardo Machiavelli, who had a reputation as a jurist, secured a liberal education, and entered public life in 1494, when the Medici were expelled from Florence. At that time the Florence republic was organized under the reforms established by Savonarola, and in 1498 Machiavelli became secretary of a board of ten, in whom were vested the military and civil powers of the new government. This position he held a period of fourteen years, and in its capacity visited various courts of Europe for the purpose of forming treaties, establishing embassies, and guarding the perpetuity of his native city. When the Medici were restored, in 1512, he was surrounded by political and personal enemies, causing him to be placed under arrest on a charge of conspiracy. Though subsequently liberated, he was deprived of his appointments. He then retired to his country home of Sam Casciano, where he devoted himself to the extensive works in literature that have made his name immortal.

In 1526 Machiavelli was employed by Clement VII. to examine the fortifications at Florence, but in the organized attempt of the Florentines for independence, in 1527, he was generally distrusted and not permitted to take a prominent part in the movement for liberation. In the spring of the same year the Medici rulers were again expelled and the republic proclaimed, but Machiavelli

was sorely disappointed in not being consulted. His works include "History of Florence from 1215 to 1492;" "Discourses on the First Ten Books of Livy," and "The Prince." In the last named work the author defends sovereign rulers, pointing out means whereby princes may secure and maintain authority without consent of their subjects, and also indicates that any available means may be used for the purpose of sustaining the governmental power. In this regard it not only reflects the character of European politics in the early part of the 16th century, but likewise exhibits characteristic phases of the theory held by sovereigns in relation to what they call the divine right of kings.

MACHINE GUN, a designation commonly applied to any ordnance that may be loaded and fired in rapid succession by mechanical appliances and combinations. The first ordnance of this character was used in the Franco-German War of 1870-71, but soon after the celebrated Gatling gun was invented and manufactured in the United States. Among the different classes of machine guns utilized in warfare are the Gatling, Hotchkiss, Nordenfeldt, Gardner, and Maxim. These guns are capable of discharging from 200 to 350 rounds in half a minute with accuracy in discharge.

McKEESPORT (mą-kēz′pōrt), a town of Allegheny county, Pennsylvania, situated on the Monongahela River, twelve miles south of Pittsburg. It is extensively connected by railroads, has a good system of public schools, numerous churches, and an academy. There are vast manufactories, representing a capital of $12,500,000. They produce ironware, electrical supplies, tin plate, machinery, engines, glass, lumber products, spirituous liquors, and tobacco. The surrounding country is fertile, and contains large deposits of limestone and coal. There is also a large commercial and jobbing trade, of which a considerable portion is done by river navigation. The city has extensive municipal facilities, including street railways, pavements, electric lights, and waterworks. It is the seat of fine school and church buildings. Population, 1900, 34,227.

McKENNA, Joseph, jurist and statesman, born in Philadelphia, Penn., in 1843. In 1855 he was taken by his parents to California. After graduating from St. Augustine College, at Benicia, California, he studied law, and in 1865 was admitted to the bar. The following year he was chosen district attorney for Solano county, was elected to the state legislature in 1875, and in 1884 became a member of congress, where he remained until 1882, when President Harrison appointed him United States circuit judge in California. His membership in congress was marked by efficient and influential service on several important committees. President McKinley appointed him attorney-general in his cabinet in 1897, and in December of the same year he was made associate justice of the United States supreme court to fill a vacancy caused by the retirement of Justice Field.

MACKENZIE (mą-kĕn′zĭ), a large river of British America. It rises as the Athabasca River in the Rocky Mountains; thence it flows a distance of about 600 miles, entering Lake Athabasca; thence has a course of 240 miles as Slave River to Great Slave Lake, and thence takes on the name of Mackenzie River, flowing northwest for a distance of 1,050 miles into the Arctic Ocean. The entire course is about 1,900 miles, and the basin drained equals 575,000 square miles. It was named from Alexander Mackenzie (1755-1820), who discovered and first navigated it in 1789.

MACKENZIE, Alexander Campbell, musician, born in Edinburgh, Scotland, Aug. 22, 1847. In 1857 he was sent to Germany to take a complete musical course, remaining there till 1862, and, after studying the violin in London, he returned to Edinburgh as a teacher of the pianoforte. In 1888 he became principal of the Royal Academy of Music at London, and in 1893 was made conductor of the Philharmonic Society. His musical works embrace a large variety of compositions, the first noted production being "Colomba," which became popular at Drury Lane in 1883. Other productions include "Bethlehem;" "Bride;" "Jason;" "Troubadour," and "Cotter's Saturday Night."

MACKENZIE, Sir Morell, physician and specialist, born in Leytonstone, England, July 7, 1837; died in London, Feb. 13, 1892. He studied at the London University, and took additional work at Paris and in Budapest. He founded the hospital for diseases of the throat at Golden Square, London, in 1863, and about the same time obtained a prize from the Royal College of Surgeons for his essay on "Diseases of the Larynx." Soon after he obtained an appointment as assistant physician in the London Hospital, became head physician in 1873, and held the position of lecturer on diseases of the throat until his death. Queen Victoria knighted him in 1887 for rendering efficient services during the last illness of Emperor Frederick of Germany. He also received distinguished honors from various foreign countries, and was a corresponding member of several celebrated medical associations. He published "Fatal Illness of Frederick the Noble;" "Diseases of the Throat and Nose," and "Hygiene of the Vocal Organs."

MACKEREL (măk′ĕr-*el*), an excellent food fish, widely distributed, and particularly abundant in the North Atlantic. It attains a length of from twelve to eighteen inches, weighing about two pounds. The color is steel-blue above with blackish markings, and silvery beneath. Usually they are caught in drift nets reaching about twenty feet below the surface. The mackerel move in

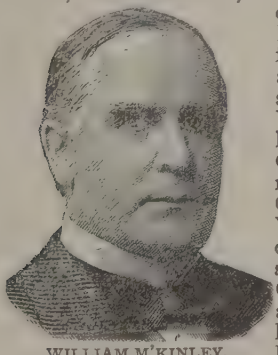
schools, are carnivorous, feeding chiefly on the fry of other fish, and are caught mostly when coming toward the shore for the purpose of spawning. The most extensive fish-

MACKEREL.

eries in America are off the coast of New England, where the common mackerel is very abundant. A species known as the Spanish mackerel is common to the Mediterranean, where it is caught in large numbers.

MACKINAC (măk'ĭ-na), or **Mackinaw**, a strait that connects Lakes Michigan and Huron. The island of Mackinac is located in the strait, about three miles east of St. Ignace, county seat of Mackinac county, Michigan, and is about two miles in width and three in length. The town of Mackinac is situated on the island. It has a good harbor and is noted as a favorite summer resort. Formerly there was a military post known as Fort Mackinac on an eminence 300 feet above the town of Mackinac, which was captured by Pontiac in 1669, and taken by the British in 1812. In 1900 the town had a population of 665.

McKINLEY (mą-kĭn'lў), **William**, twenty-fourth president of the United States, born at Niles, Ohio, Jan. 29, 1843; died Sept. 14, 1901. He descended from Scotch-Irish ancestors, on the side of his father, William McKinley, and Scotch-German by his mother, Nancy Campbell Allison. When nine years of age, his parents settled at Poland, Ohio, where he attended the public school and Union Seminary. In 1860 he entered Alleghany College, Meadville, Penn., but left the institution on account of overstudy and failing health. After teaching school a short time, he enlisted in the Union army, in 1861. He served throughout the war and attained the rank of captain with the brevet of major. In 1865 he resigned his commission, took a law course in the Albany Law School, and was admitted to the bar in 1867, beginning the practice of law in Canton, Ohio. Stark county was democratic, but Major McKinley was elected to the position of prosecuting-



WILLIAM M'KINLEY.

attorney in 1869, though two years later he was defeated. In 1876 he was nominated by the republicans for congress and was elected, holding the position until 1882, when he was defeated, but was again elected in 1884. He remained in the lower house of congress consecutively until 1890, when he was defeated for reëlection.

Major McKinley was elected governor of Ohio in 1891, was reëlected to the same position in 1893, and in 1896 he was nominated by the republican convention at St. Louis for the presidency on the first ballot. At the election he secured 7,104,779 popular votes, and 271 electors; while W. J. Bryan, his democratic opponent, received 6,502,925 popular votes, and 176 electors. In his political career McKinley was a persistent advocate of a high protective tariff, and was the author of the McKinley tariff law, which was passed by congress in 1890. The main features of that law were the leading tenets of his political doctrine. He was reëlected in 1900 by a large majority, receiving 7,217,677 of the popular votes and 292 votes in the electoral college, while W. J. Bryan, his democratic opponent, received 6,357,853 popular votes, and 155 of the electors. On Sept. 6, 1901, while attending the Pan-American Exposition in Buffalo, New York, he was shot twice by an anarchist named Leon Czolgosz (1873-1901). The wounds inflicted were mortal, the president dying in Buffalo eight days after the assassin's hand was laid upon him. On Oct. 29, 1901, the assassin was executed, after a trial in Buffalo. Among the important events of President McKinley's administrations are the annexation of the Hawaiian Islands and Porto Rico; the Spanish American War; the war in the Philippines; the independence of Cuba, and the adoption of the single gold monetary standard in 1897. Both as a writer and speaker he was tactful, efficient, and convincing. His addresses and public documents bear the marks of sincerity and conservatism. He was buried at Canton, Ohio, where he resided many years, and was deeply mourned by the nation.

McLEAN (măk-lān'), **John**, jurist, born in Morris county, New York, March 11, 1785; died in Cincinnati, Ohio, April 1, 1861. He was the son of a farmer, studied law, and was admitted to the bar in 1807, settling for practice at Lebanon, Ohio. He served in congress from 1812 to 1816, was elected to the Ohio supreme court in the latter year, and in 1822 became commissioner of public lands. President Monroe appointed him postmaster-general in 1823; he was retained in the same position by John Quincy Adams, and was made an associate-justice of the United States supreme court by President Jackson in 1830. In the Dred Scott Decision he dissented from the opinion of the court as given by Chief Justice Taney. In 1848 he went over from the democrats to the free soil party, and was mentioned as a candidate

for president in the republican conventions of 1856 and 1860. His writings include "Eulogy on James Monroe."

MACLISE (mak-leess'), **Daniel**, painter, born in Cork, Ireland, Jan. 25, 1811, died in London, England, April 1, 1870. He was of Scotch extraction, entered the London Royal Academy in 1828, and made his first exhibit of pictures at the British Institution in 1833. His works include excellent mural paintings and other works of fine finish, many of which have been engraved and are familiarly known. Among the most famous are "All-Hallow Eve;" "Banquet Scene in Macbeth;" "Shakespeare's Seven Ages;" "Death of Nelson at Trafalgar;" "Meeting of Wellington and Blücher after the Battle of Waterloo;" "Caxton Printing Office," and "Scene from Twelfth Night."

MACLURE (mak-lūr'), **William**, geologist, born in Ayr, Scotland, in 1763; died at St. Angel, Mexico, March 23, 1840. In 1796 he emigrated to America, and subsequently made it his home. He became a commissioner to France in 1803 to adjust spoliation claims held by citizens of the United States on account of losses incurred in the French Revolution, and while there equipped himself for geological enterprises. After returning to America, he engaged in a private geological survey, visiting most of the states and territories, and later published a geological map and valuable data. He became president of the Academy of Natural Sciences in 1818, serving in that capacity until his death. In 1819 he visited Spain with the view of encouraging the founding of an agricultural college, and shortly before his death made a trip to Mexico for his health.

MACMAHON (mäk-mä-ôn'), **Marie Edme Patrice Maurice**, statesman and soldier, born in Sully, France, June 13, 1808; died at Montcresson, Oct. 17, 1893. He descended from an Irish Catholic family, was educated at the military school at St. Cyr, and engaged in the expedition to Algeria, distinguishing himself in the attack on Constantine in 1837. In 1852 he became a general in the army, took an efficient part in the Crimean War, especially in assaulting the Malakoff tower at Sebastopol, and was accordingly appointed senator in 1856. In the Italian campaign of 1859 he was equally efficient, because of which he became a marshal of France and was created duke of Magenta. He commanded in the defense of Alsace in 1870 against an attack by a large force. The German army under the crown prince of Prussia defeated him in the battle of Warth, and at Sedan again defeated his force of 120,000 men and took MacMahon and Napoleon prisoners of war. He became commander of the army that suppressed the Commune in 1871, and, after the overthrow of Thiers, in 1873, he was chosen president of the republic. At heart MacMahon was a monarchist, but faithfully observed his oath in preserving the republic. After the elections of 1878 he was compelled to resign, the resignation taking effect Jan. 30, 1879. After retiring from the presidency, he resided on his estate at Montcresson.

McMONNIES, Frederick, sculptor, born in Brooklyn, New York, Sept. 28, 1863. He first studied sculpturing under Augustus St. Gaudens, and in 1884 took training in Paris, France. In 1889 he made an exhibit of a splendid production known as "Diana" at the Salon. Two years later he received the first medal ever granted to an American sculptor in France. His works are numerous, the most noted being "Faun with Heron;" "Fountain at the Columbian Exposition;" "Shakespeare;" "Bacchante with Infant Faun;" "Victory," and "Sir Harry Vane."

MACOMB (ma-kōōm'), county seat of McDonough county, Illinois, located 185 miles southwest of Chicago. It is surrounded by a fertile farming country, has good railroad connections, and manufactures earthenware, flour, and machinery. The city has modern municipal facilities. It is the seat of a state normal school and McDonough Normal College. Population, 1900, 5,375.

MACON (mā'kŭn), an important commercial and manufacturing city of Georgia, in Bibb county, on the Ocmulgee River. It is connected by a large number of important railways, giving it trade advantages in produce and merchandise. The manufactures represent a capital of $4,500,000 and employ 3,500 persons. Among the products are cotton and woolen goods, clothing, lumber products, machinery, brass and iron wares, spirituous liquors, and utensils. Among its public buildings are many fine churches and a modern county courthouse. It has a fine public school system, and is the seat of Jones' Home for Indigent Women, the State Academy for the Blind, the Alexander Free School, a Roman Catholic college, Mercer University, Wesleyan College, and two orphans' homes. The municipal facilities include pavements, electric lights, street railways, and waterworks. Population, 1900, 23,272.

MACON, Nathaniel, statesman, born in Warren county, North Carolina, Dec. 17, 1757; died there June 29, 1837. After securing an elementary education, he entered the Revolutionary War as a private soldier, served in the state legislature in 1780-86, and was a member of congress from 1791 to 1815, being speaker of the house from 1801 to 1807. In 1815 he was elected to the United States senate from North Carolina, serving in that capacity a period of thirteen years. His total service in congress covered a period of thirty-seven years, and was distinguished for political purity. Politically he affiliated with the democrats.

MACPHERSON (mak-fer'son), **James**, author, born in Ruthven, Scotland, in 1738, died there Feb. 17, 1796. After graduating

at King's College, Aberdeen, he engaged in school teaching in his native town, but also contributed to the "Scots Magazine," and in 1758 published a poem entitled "The Highlander." In 1760 he published verses that are reputed to be translations from the Gaelic verse, and subsequently a subscription was raised which enabled him to make a tour through the portions of Scotland occupied by the Gaelic race. In 1762 he published six volumes, entitled "Fingal," an epic poem. These and others excited marked attention, but their genuineness was questioned, and many critics regarded them as purely imaginative. Macpherson was elected to parliament in 1780, where he held a seat for ten years, and subsequently retired to his estate in Inverness-shire. His remains were brought to England and interred at Westminster Abbey.

McPHERSON, James Birdseye, general, born in Sandusky county, Ohio, Nov. 14, 1828; slain in battle near Atlanta, Georgia, July 22, 1864. In 1853 he graduated at the head of his class from the West Point Military Academy, became an instructor there, and subsequently served as engineer at New York harbor. At the beginning of the Civil War he was stationed in California, but soon after was transferred to the staff of General Halleck, and promoted to the rank of lieutenant-colonel. He distinguished himself with General Grant at Forts Henry and Donelson, took part in the battle of Shiloh and the siege of Corinth, and in 1863 commanded the seventeenth army corps. General Grant recommended his promotion to the rank of brigadier-general after the Vicksburg campaign, and in 1864 he accompanied General Sherman in the Atlanta campaign. While superintending his troops he was shot and death followed almost instantly. General McPherson was a skillful soldier, an able tactician, and his gentle manners made him universally popular.

McCREADY (mak-ree'dĭ), **William Charles,** tragedian, born in London, England, March 3, 1793; died at Weston-Super-Mare, Somersetshire, April 29, 1873. He studied at Rugby and was intended for the law, but later decided to go on the stage, making his first appearance at Birmingham in 1810. Later he appeared successfully at London in "Richard III." and several other Shakespearean plays, visited the United States in 1826, and afterward made extended tours through continental Europe. His second visit to the United States was in 1843 and his third in 1848. While playing in Astor Place during the latter visit a riot resulted, in consequence of a misunderstanding between himself and Edwin Forrest, in which several persons were killed. In 1851 he retired from the stage with a reputation alike eminent for literary culture and qualifications as an actor.

MACVEAGH (mak-vā'), **Wayne,** lawyer and statesman, born in Phœnixville, Penn., April 19, 1833. He studied at Yale, secured admission to the bar in 1856, and was captain of cavalry in 1862. From 1870 to 1871 he was minister to Turkey, served as chairman of a commission appointed by President Hayes in 1877 to investigate affairs in Louisiana, and in 1881 became attorney-general of the United States. This position he resigned the same year, and in 1893 was appointed minister to Italy. He not only demonstrated marked ability as an attorney, but rendered valuable services as a diplomat.

MADAGASCAR (măd-a-găs'kar), a large island in the Indian Ocean, located off the southeastern coast of Africa, and separated from it by the Mozambique Channel. It ranks as one of the largest islands in the world. Its length from northeast to southwest is 975 miles; breadth at widest point 356 miles, and area 228,500 square miles. The population has been variously estimated, but is now placed at about 4,575,000. Its surface is generally elevated, its average height above sea-level being about 3,500 feet, and the highest mountain ranges approximating 9,000 feet. The coast regions contain a number of large fertile tracts and few large indentations, but have a number of good harbors. Among the principal rivers are the Mangoky and the Ikopa, and the principal inlet is Antongil Bay. The highlands have a temperate climate, but some of the coast regions are hot, while excessive rains and extensive marshes in various localities render large areas unfavorable to European colonization.

The productions of Madagascar are various, including principally agricultural, mineral, and fish. Among the soil products are rice, coffee, sugar, gum-copal, vanilla, and many varieties of tropical fruits. There are also productions of india-rubber, lumber, cattle, hides, silk, and sweet potatoes. The forests are abundant and embrace many valuable woods, including many varieties of palms, and occur most extensively in a circle around the entire island and some distance from the coast. Among the minerals are iron, copper, lignite, galena, gold, graphite, sulphur, and various building-stone. The chief manufactures include jewelry, carpets, silk goods, cloth, straw-work, and lumber products. Roads and wheeled-vehicles are being introduced rapidly. A line of railway has been constructed some distance from Antananarivo. Commercial relations are sustained with France, the United States, Germany, England, and other European countries. The principal imports are cotton and woolen goods, ironware, spirituous liquors, tinware, and tobacco.

Many species of wild animals are still abundant in Madagascar, among them the lemurs, lizards, crocodiles, chameleons, snakes, and many beautiful birds of song and plumage. The natives speak a Malayan language, and belong to the Malayo-Polynesian class of people. There are various

tribes, of which the Hovas are the most powerful, and the several classes are graded differently in civilization and religion. Most of the architecture is of frame timber and bamboo, though rapid progress is made in manual arts, especially in carpentry, weaving, and iron work. The religion is fetichism, while infanticide and polygamy are still practiced, but superstition is fast giving way to the missionary influence exerted by Christianity.

France has laid claim to Madagascar since 1642, but little was done till recent years to establish the claim and develop the natural resources. The earliest information of this island was published by Marco Polo in the 13th century, and the Portuguese cruised off its coast in 1506, publishing an account of it in which the name St. Lorenzo was applied. Radama I. was recognized as the reigning sovereign of the Hova tribe in 1810. He encouraged missionary work, and authorized a translation of the Bible into the Malagasy language. At his death, in 1828, his queen, Ranavalona, became ruling sovereign. She resisted French occupation and refused Christians free access and communication. Her son, Radama II., succeeded to the throne in 1861. He not only admitted missionaries, but encouraged improvements and emancipated the slaves. The liberality shown by him led to his assassination by a native in 1863, and Queen Ranavalona II. ascended the throne. Soon after a war resulted with France, but it terminated in French recognition and the establishment of a governor-general at Diego-Suarez. The queen was formally deposed in 1897 and exiled to Reunion Island. Antananarivo is the capital. Other trade centers include Mojanga, Tamatave, Antombaka, and St. Dauphin.

MADEIRA (ma-dē'ra), a large river of South America, the most important tributary of the Amazon. It is formed at the boundary line between Bolivia and Brazil by the confluence of the Guapore and Mamore rivers, and after a course of 935 miles joins the Amazon about one hundred miles below Manaos. It has a basin of nearly 500,000 square miles, and its total length to the source of the Mamore is 3,110 miles. There is a fall 715 miles above its mouth, called Sao Antonio Falls, and above that navigation is impossible, the series of cataracts extending about 225 miles. The Madeira valley and those of its tributaries are exceedingly fertile. They contain vast forests and the most productive rubber regions in the world. The region is being rapidly developed under governmental encouragement. A railroad has been projected around the rapids.

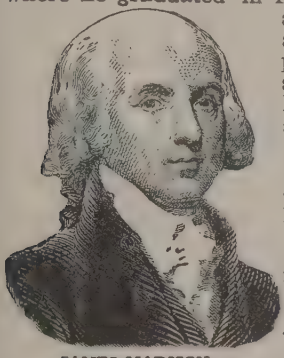
MADEIRA, an island group situated about 350 miles northwest of Africa, nearly due west of Morocco. The largest island is named after the group. It has a length of thirty-five miles, a breadth of from nine to fifteen miles, and an area of 315 square miles. The surface is diversified by mountain ranges, the culminating peak of which has a height of 6,010 feet. There are many small islands of importance adjacent to Madeira, the most valuable of which are Porto Santo and Desertas. The productions are principally live-stock, cereals, wine, sugar, and tropical fruits. It is noted for the excellence and abundance of its vines, which bear successively for many years. The island group belongs to Portugal, and has been in possession of the Portuguese since 1431, when it was colonized by them. It has some remains of Roman occupation, including ruins of several fortifications. The inhabitants consist principally of Negroes, Portuguese, and Moors. Funchal is the commercial center and capital. Population, 145,500.

MADISON, a city of Indiana, in Jefferson county, on the Ohio River, and well connected by railway and steamboat lines. The surrounding country is agricultural and dairying. Among the manufactures are furniture, cotton and woolen goods, engines, steamboats, boilers, and machinery. The city has good school facilities. Waterworks, sewerage, pavements, and electric street railways are among the improvements. It is the seat of a large trade in merchandise. Population, 1900, 7,835.

MADISON, the capital of Wisconsin, county seat of Dane county, about eighty miles west of Milwaukee. It has a beautiful situation between Lakes Menona and Mendota, which have been improved by parks and hotels and form a popular summer resort. The city has important manufactures of flour, bicycles, wagons, ironware, farm machinery, and furniture. It is improved by an excellent electric street railway system, public lighting, pavements, waterworks, and several libraries. Among the excellent buildings are the capitol, the United States postoffice, the soldiers' orphans' home, and the state lunatic asylum. It has a well organized public school system, several institutions of higher learning, and is the seat of Wisconsin University, an institution founded in 1850. The university has a faculty of able instructors, an excellent library, and is attended by about 2,000 students. It has a fine campus and modern equipments. The Washburn Observatory is connected with the university, while the Wisconsin Historical Society is an eminently efficient association, and has a library of 70,000 volumes. Several railroads focus in Madison, making it a convenient commercial center. It also takes high rank on account of its Chautauqua assembly meetings. Population, 1900, 19,164.

MADISON, James, fourth president of the United States, born in Orange county, Virginia, March 16, 1751; died in Montpelier, Virginia, June 28, 1836. He was the son of James Madison, a man of English descent, who settled in Virginia at an early period.

His early education was by private tutors, and in 1769 he entered Princeton College, where he graduated in 1771, but remained at that institution another year to pursue college studies under President Witherspoon. Shortly after he was admitted to the bar and began the practice of law in Virginia. In 1776 he was chosen a member of the Virginia assembly, served as a member of the executive council in 1778, and in 1779 became a me ber of the continental congress, in which body he took an active and prominent part till 1784. The Virginia legislature appointed him a delegate to Annapolis, Maryland, in 1786, to aid in devising a system of commercial regulations for all the states, which body proposed a convention of delegates to be held in Philadelphia in May, 1787. In this convention the constitution of the United States was framed, and Madison was an influential member of that body. He kept, a careful account of its proceedings, which about fifty years afterward was published as the "Madison Papers." In 1788 he wrote a portion of the "Federalist," and did much by his persuasive and conciliatory spirit to secure the ratification of the constitution by Virginia.



JAMES MADISON.

In April, 1789, Madison took his seat in the house of representatives of the first congress that assembled under the constitution, and continued a member of that body during both terms of Washington in the presidency. He married Mrs. Dolly Paine Todd of Philadelphia, the widow of a Pennsylvania lawyer, in 1794. He declined the office of secretary of state when it was offered to him in 1793, retired from congress in 1797, and in the following year accepted a seat in the Virginia assembly, where he wrote the resolutions opposing the Alien and Sedition laws passed in the administration of President Adams. President Jefferson selected him as secretary of state in 1801, which position he held during both terms of that president, and which he filled with such eminent ability that he was elected as the nominee of the democratic-republican party to the presidency in 1808, receiving 122 electoral votes, while forty-seven were cast for the federalist, Charles C. Pinckney, and six for George Clinton. The inauguration took place on March 4, 1809, and in 1812 he was reëlected by receiving 128 electors and DeWitt Clinton eighty-nine. He retired to private life on March 4, 1817, and spent the remainder of his days at his home in Montpelier. In 1829 he served as a member of the state convention to revise the Virginia constitution, and was president of an agricultural society. Madison was an able statesman, universally respected, but did not possess distinguished power as an orator, and was not particularly vigorous in administrative functions. Among the events of his administration was the War of 1812, which terminated Dec. 14, 1814, by the treaty of Ghent, but the last battle was fought the following January at New Orleans, General Jackson not having heard of the peace treaty. He published a number of able papers, the most important being "An Examination of the Doctrine which Subjects to Capture a Neutral Trade not Open in Time of Peace."

MADONNA (mȧ-dŏn'nȧ), the Italian equivalent for madam, and applied specially to the Virgin Mary, hence pictures of the Virgin are called Madonnas.

MADRAS (mȧ-drȧs'), a seaport city of India, capital of the Madras presidency. It is situated on the Coromandel coast of the Bay of Bengal. The city has extensive canal and railway connections, is the center of a vast interior and foreign trade, and contains a well equipped garrison. Its harbor is not naturally commodious, but has been improved materially by piers, and a splendid lighthouse towers to a height of 125 feet and may be seen a distance of fifteen miles. There are manufactures of various kinds, but not until recent years have they become particularly noteworthy. They include clothing, machinery, earthenware, soap, flour, and canned fish. The principal buildings embrace a government house, the Scotch Church of St. Andrew, St. George's Cathedral, Madras Polytechnic Institution, and a large number of Hindu and Mohammedan temples. The English founded Madras in 1639, after obtaining a grant of land from a native prince. It has been affected materially by hurricanes that sweep from the sea over the lower parts of the site during the monsoon period, from May to October. The population consists mostly of Hindus, but there are 50,000 Mohammedans and about 4,250 Europeans. Brahmanism is the religion of a majority of the people. Population, 454,160.

MADRID (mȧ-drĭd'), the capital of Spain, situated in the Madrid province, on the Manzanares River, a tributary of the Tagus. It has a site on a plateau 2,450 feet above sea-level, in the geographical center of Spain. The city is connected extensively by railroads, and has important commercial and manufacturing enterprises. The history of the city dates to 952, when it was occupied by the king of Leon, Ramiro II., and in 1560 it was made the exclusive seat of government by Philip II. The extremes in temperature make it quite unhealthful, the rate of mortality being exceedingly large. It has important public institutions, among them many excellent churches, hospitals, libraries, royal academies, public schools, and a

splendid university. The royal palace is built of granite. It is a fine structure in the form of a square, 470 feet on each side, and one hundred feet in height. Its armory is counted among the finest in Europe. The municipal facilities of the city are modern, including splendid pavements, public lighting and waterworks, and a street railway system. Philip V. founded its library, which at present contains 250,000 volumes. Its university has extended courses of study and an attendance of 6,100 students. The bull-fights held annually at Madrid attract vast audiences, spectators coming from various countries of South Europe. Other places of amusement and interest are its public parks, promenades, and several museums, including the Royal Museum of Painting and Sculpture. Population, 511,750.

MAELSTROM (māl'strŭm), a celebrated whirlpool near Moskenes, an island of the Lofoden group, off the northwestern coast of Norway. There are many legends that relate of large vessels being sunk in the deep, but most of them are fabulous. It is dangerous in winter, when it rages so furiously that its roaring sound is heard many miles. This is also the case when a strong wind blows from the northwest. At those times it is capable of engulfing small vessels which approach it. The maelstrom is due to the currents of the Great West fiord.

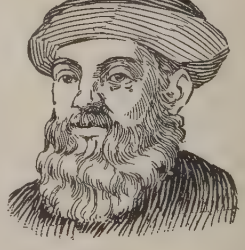
MAESTRICHT (mäs'trĭkt), a city of Holland, capital of the province of Limburg, on the Maas River, eighteen miles northwest of Aix-la-Chapelle, Germany. It is connected by important railroads, giving it commercial advantages, and was once a fortress of great strength, but has been reduced to a garrison. It has a fine statue of Charlemagne. There is a stone bridge across the river, which connects it with Wijk. The manufactures, educational institutions, and jobbing trade are important. It has pavements, public parks, and electric street railways. Population, 33,640.

MAGDALENA (măg-dä-lā'nä), an important river of South America. Its source is in the southern part of Colombia. It flows nearly north, and discharges into the Caribbean Sea by a delta at Sabanilla. The Cauca is its principal tributary, which rises about ten miles from the source of the Magdalena and joins it near 9° north latitude. Other streams flowing into it include the Bogota and Sogamoso rivers. The Magdalena has a length of 975 miles, and is navigable to Honda, 450 miles from its mouth. Above that point is a series of rapids. However, they have been paralleled by a railway line, by which connection is afforded with considerable navigation facilities in the upper course. The delta of the Magdalena includes 3,000 square miles.

MAGDALENE (măg-da-lē'ne), **Mary**, a woman mentioned in the New Testament as a native of the town of Magdala, near Tiberias, and who ministered to the physical wants of Jesus. It is related that seven devils were cast from her; that she witnessed the crucifixion, and that she was among the first who came to the sepulcher on the first Easter with sweet spices. She was the first to see Christ after the resurrection. Mary Magdalene has been mentioned erroneously as the one who anointed the feet of Jesus with ointment, but that distinction is due to Mary, the sister of Martha and Lazarus.

MAGDEBURG (măg'dę-bo͝org), a railroad and commercial city of Germany, capital of Prussian Saxony, and noted as a strong fortress. It is located on the Elbe River, seventy-five miles southwest of Berlin. The city has important manufactures of silk, cotton, and woolen goods, leather, gloves, vinegar, beet-sugar, tobacco, ribbons, chicory, machinery, and musical instruments. The river navigation and canal improvements, together with its numerous railroads, make Magdeburg an important jobbing center. There are important educational institutions, including a fine public school system, normal schools, two gymnasia, institutions for the dumb, blind, and deaf, and professional training institutions. Its cathedral is one of the most remarkable in Europe. It was founded in 1208, and contains the graves of many noted sovereigns, among them Emperor Otho, the founder of the city. Wallenstein laid siege to Magdeburg for seven months in the Thirty Years' War, but in 1631 it was captured by Tilly, who not only sacked it, but caused the death of 30,000 of its people. It has enjoyed remarkable prosperity for more than a century. Among its improvements are excellent parks, statuary, electric street railway systems, sanitary provisions, and public libraries. Population, 235,428.

MAGELLAN (mą-jĕl'ąn), or **Magalhaens, Ferdinand**, eminent navigator, born in Oporto, Portugal, in 1470; slain in the Philippine Islands, April 27, 1521. He descended from a respectable family, spent his youth under the direction of Queen Leonora, consort of John II. of Portugal, and received a liberal training. It was his ambition to reach the Moluccas by sailing westward, and with that end in view received aid from Charles V., king of Spain. On Aug. 10, 1519, his expedition of five ships sailed from San Lucas, and, after crossing the Atlantic, a safe landing was effected at the mouth of the La Plata River in South America. The expedition next took a course southward



FERDINAND MAGELLAN.

along the coast of Patagonia, discovered Magellan Strait, and, after passing through it, reached the ocean west of South America, which he named Pacific because of the quiet aspect of its waters when first seen by him. Continuing in a course toward the west, the expedition reached the East Indies, effecting a landing on the Philippine Islands, to which he made a formal claim in the name of Spain. His authority was resisted by the natives, and, after endeavoring to persuade them to embrace Christianity, he was slain in an attack made upon a company then upon the shore. On Sept. 6, 1522, more than three years after the expedition left Spain, Capt. Sebastian del Cano reached San Lucas and told the story of mingled triumph and tragedy. This expedition was the first to make a complete tour around the earth.

MAGELLAN, Strait of, an important channel that separates the island of Tierra del Fuego from the continent of South America. It is from eight to fifty miles wide, about 350 miles long, and forms a connection between the waters of the South Pacific and the South Atlantic. Its navigation is endangered by numerous islands. The name was applied in honor of Ferdinand Magellan, who discovered it in 1520 and sailed through it successfully. On its shores are thousands of aquatic birds, including ducks, geese, gulls, penguins, cormorants, and oyster catchers.

MAGENTA (mä-jĕn'tä), a town of Italy, situated on a railway line about seventeen miles west of Milan. It is noted as the scene of a celebrated battle, on June 4, 1859, between the Austrians and French. The latter were commanded by Marshal MacMahon, who defeated the Austrians under command of Count Gynlai. It is estimated that the French lost 5,000 men and the Austrians about 10,000. MacMahon was soon after created duke of Magenta.

MAGGIORE (mä-jō'rā), a lake on the boundary line between Switzerland and Italy, but situated mostly in the latter country. It has a length of forty miles. Its average breadth is about four miles and the greatest depth nearly 2,000 feet. It is thought that its origin is from volcanic action. There are splendid vineyards and fertile fields surrounding the lake, but adjacent to its northwestern coast are mountains of solid granite. In its vicinity are several railroads and prosperous towns.

MAGI (mā'jī), a name first mentioned by the prophet Jeremiah in connection with an officer of Nebuchadnezzar, and afterward applied by Herodotus to one of the six Median tribes. Subsequently the Magi became an hereditary priestly caste of the Medes and Persians, who were regarded the servants of God and the preservers and propagators of sacred rites and traditions. This priestly caste had much influence in the affairs of individuals and of the state, and, besides conducting religious worship, had charge of the education of princes and nobles. In the time of Zoroaster the Magi were reformed and disciplined, but later declined in influence until they developed into magicians and fortune-tellers.

MAGIC, the alleged art of exercising supernatural powers by calling into activity the spirits of departed beings, or employing enchantment, sorcery, and witchcraft. Superstition and belief in magical arts dates from remote history, and, after passing through the various centuries, it is still adhered to among the unlearned Gypsies and other classes, who reap a rich harvest by acting upon the credulity of superstitious people. Natural magic is a term applied to the art of utilizing natural causes to produce effects apparently supernatural.

MAGIC LANTERN, an instrument invented by a German Jesuit, Athanasius Kircher, in 1645. It consists of a case or box in which the scattered rays of some powerful light are confined and made to pass through a tube. A concave reflector put opposite the tube, back of the lamp, aids in condensing the light and directing it through the tube, in which powerful lenses are arranged to condense the diverging rays upon paintings on glass, which slide in a sort of stage, and another object glass throws the image of the highly illuminated object upon a white wall or screen, the focus being adjusted by sliding this lens nearer to or farther from the object. The best effects are secured in a room highly darkened, but the size and beauty of the pictures cast upon the screen depend upon the relative distances of the object from the lenses and the lenses from the screen, and the power of the light. A brilliant picture twenty feet in diameter may be secured from a slide three inches in diameter under powerful light. To appear erect upon the screen, the picture slides must be inserted into the tube in an inverted position. Recently vast improvements have been made in the magic lantern by discarding the oil lamp and substituting for it oxy-hydrogen and electric lights. A very beautiful effect is secured by what is known as "dissolving views." It involves having two reflectors so placed that the images of two pictures are thrown at the same time on the screen, causing one to fade or melt into the other.

MAGNA CHARTA (măg'nȧ kär'tȧ), or **Great Charter,** an important document regarded as a basic guarantee of liberty, and which was extorted by the people of England from King John at Runnymede, June 15, 1215. This document was brought about by the tyranny and oppression practiced by the Norman kings under the feudal system, on account of which the barons rose up with the hearty support of the people demanding reforms. Among the reforms guaranteed were included the protection of property, liberty, and life against arbitrary

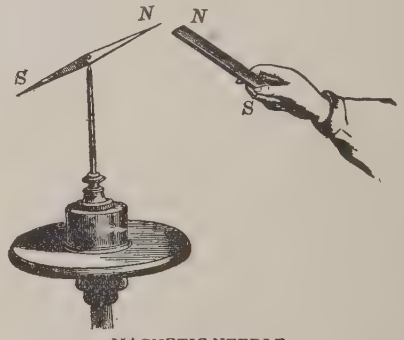
kings, and these were firmly protected under uniform and just laws. The barons were accorded certain privileges that tended to the proper enforcement of civil rights and social freedom. There were also equitable provisions in relation to traders, in regard to the church, and in relation to freemen generally, especially the protection guaranteed under a jury system. Several successors of King John confirmed the Great Charter at various times, but it has since been repealed in letter, though its spirit has been embodied firmly in a number of acts of parliament and many legal decisions.

MAGNESIA (măg-nē′zhĭ-à), an earthy powder. It is tasteless, white in color, and possesses alkaline properties. Magnesia is used in medicine as a laxative, and, administered in small doses, it acts as an antacid. Pure magnesia is obtained by exposing the hydrated carbonate to a red heat. Treated in this way, it forms the pure commercial article known as calcined magnesia.

MAGNESIUM (măg-nē′zhĭ-ŭm), a mineral of wide distribution, constituting a silver-white metallic element. It may be obtained by reducing magnesium chloride with metallic sodium, or by the electrolysis of fused magnesium chloride. At an ordinary temperature it is more brittle than silver, but becomes malleable when the temperature is increased, and may be formed into wire or ribbon. Its silver-white color is preserved in dry air, but when exposed to moisture it becomes tarnished. When heated in the flame of a candle or in oxygen gas it burns with a dazzling light. It is rich in chemical, actinic rays, a property that has led to its use in photography, but more recently the electric light has been utilized in its stead. In an atmosphere of carbonic acid gas it decomposes the gas in burning, constitutes magnesic oxide, and forms the carbon into a powder. Calcined magnesia is obtained by reducing magnesium to ashes. Magnesium deposits occur extensively in various metals, in serpentine rock, meerschaum, soapstone, asbestos, and other minerals.

MAGNETISM (măg-nĕt′ĭz'm), the science that treats of the laws and conditions of magnetic force. The name was coined from Magnesia, a town in Asia Minor, near which a black mineral known as loadstone is found embedded with iron ore in volcanic rock. This mineral is also found in New York, New Jersey, Siberia, and Sweden, and is generally termed magnetite. It has the peculiar property of not remaining at rest when suspended, except when certain points are directed north and south. This quality caused the ancients to use it to direct ships at sea, for which purpose the mariner's compass displaced it. A piece of loadstone is called a natural magnet, and differs from an artificial magnet, which may be made of a bar of soft iron or steel by imparting to it the peculiar magnetic property by friction from other magnets, or by the action of an electric spark. Artificial magnets retain their magnetic properties for a short or long time, depending on the quality of the iron of which they are made. Pure soft iron remains a magnet only while the magnetizing action lasts, and one so made is called a temporary magnet; while hardened iron and steel retain their magnetic properties a long time, these metals being used to make permanent magnets. The best permanent magnets are made of hardened steel. They are called bar magnets if straight, and horseshoe if U-shaped. The two ends of a horseshoe magnet are connected by a soft iron called the armature.

The cause of magnetic force is unknown, but is generally believed to be due to molecular action. It is thought that every magnetizable body, whether the body is magnetized or not, constitutes a permanent magnet, but before it is magnetized the poles of the molecules point in every direction, thus neutralizing one another. When increasing magnetization is produced by friction or electric induction, the action of the molecules becomes more and more nearly parallel, and a closed electric current flowing around each molecule results. Since both natural and artificial magnets, when fully suspended, rest with their length in a direction north and south, they serve in constructing the compass. The attraction is greatest at the extremities, which are designated respectively the north and south poles, and decreases toward the middle. The north-seeking pole is distinguished as the positive, and the south-seeking as the negative, marked + and — respectively. The similar poles of magnets repel and the dissimilar attract each other, the intensity of repulsion and attraction varying inversely as the square of the distance. All substances are attracted or repelled, though in most cases the action is very feeble. Those attracted are called paramagnetic, and those repelled diamagnetic substances, though the latter class is most numerous. To illustrate, iron is attracted by both poles of a magnet, while bismuth is repelled by both. The magnetic



MAGNETIC NEEDLE.
NN, North Poles. *SS*, South Poles.

field is the space surrounding a magnet in which attraction or repulsion takes place, and corresponds to the electric field surrounding an electrified body. Magnets depend for their strength upon size, material, and construction, varying greatly with the modification of each. One of the largest magnets in the world is at the Stevens Institute of Technology, in New York, which weighs 1,600 pounds, and has a lifting capacity of about forty tons, exceeding its own weight about fifty times.

The circumstance that the poles of a magnet point to the north and south is accounted for by the fact that the earth is a great magnet. Its magnetic poles do not correspond with its geographical poles, but they are known to attract the poles of a magnet. The magnetic needle, therefore, does not point to the true geographical north in all parts of the earth, but slightly east or west of it. This deviation from the true north is

MAGNOLIA.

called declination or variation, and differs in different parts of the earth. Sir J. C. Ross in 1831 discovered the magnetic north pole in latitude 70° 5′ north and longitude 90° 46′ west, which is about 1,000 miles from the geographical north pole. The magnetic south pole has not yet been discovered, but the magnetic equator has been partially traced, and is known to cross the terrestrial equator at several places, though never deviating more than 12° from it. The earth appears to owe its magnetism to the electricity circulating in the atmosphere. This atmospheric electricity is probably produced by the sun's rays heating unequally different portions of the earth's surface. In many places the lines of force of the earth's magnetic field are inclined to the earth's surface. Where this is the case one of the poles of a magnetic needle is inclined to the earth, which is called the inclination or dipping of the needle. The north pole is inclined in the northern hemisphere and the south pole in the southern. At the magnetic poles the needle dips vertically downward, and at the magnetic equator it assumes a horizontal position.

MAGNETO-ELECTRIC MACHINE. See **Electric Machine, Dynamo, Electricity**, etc.

MAGNOLIA (măg-nō′lĭ-à), a genus of ornamental shrubs and trees, native to North America, China, India, Japan, and other portions of Eurasia. There are many species noted for their great beauty, handsome flowers, and evergreen or deciduous leaves. The flowers of some varieties are ten inches in diameter, but most bear smaller flowers, white or purple-white in color, and noted for their fragrance. The wood is of little value on account of its being soft and spongy, but some of the trees attain a large size and yield woods utilized in manufacturing ornamental products and baskets. Some species have roots of which the bark is serviceable in preparing a useful tonic; the Virginian magnolia bears a cone serviceable in preparing a spirituous liquor, and is of value in rheumatic complaints, while the umbrella variety has tonic properties. The largest American variety is common to the region from North Carolina to the Gulf. It attains to the height of seventy feet, has evergreen laurel-like leaves, and bears a whitish flower. The magnolia tree has been cultivated nearly 2,000 years in China, where it thrives at high elevations and serves as a favorite ornamental tree.

MAGPIE, the name of a beautiful bird classed with the crow family, but differing

MAGPIE.

from the common crow in having a smaller body, short wings, long tail, and various

colors. Several species of magpies have been described, two of which are native to America, and abound from the northern portion of the continent to the Gulf of California. The common magpie is from fourteen to eighteen inches in length, has black and white plumage with markings of purple and green, is shy, but cunning in obtaining food and avoiding enemies. It subsists principally on animal food, and delights to prey upon the eggs and young of other birds, for which purpose it robs their nests promiscuously. The nests are built substantially, some species constructing a dome of interwoven sticks for protection, and the eggs are usually from six to nine in number, bluish-green in color, and blotched with ashen hues. The magpie is generally met with in pairs, issues a chattering note, and may be domesticated, even showing capability of learning to articulate some words by imitation, and is inclined to hide articles of bright color. Most species are shy in a native state, but in populated districts they become familiar and build their nests under the eaves of habitations and churches.

MAGRUDER (mą-grū'dẹr), **John Bankhead**, general, born in Winchester, Virginia, Aug. 15, 1810; died in Houston, Texas, Feb. 19, 1871. In 1830 he graduated at the West Point Military Academy, served as captain in the Mexican War, and was promoted to the rank of lieutenant-colonel. He resigned his commission at the beginning of the Civil War and joined the Confederate army as a brigadier-general. His services were distinguished particularly at Yorktown, in the peninsular campaign, and in commanding the department of Texas, where, in 1863, he recaptured Galveston. After the Civil War he joined the imperial forces of Mexico under Maximilian, but when the republic was reëstablished he returned to the United States and attracted large audiences by his lectures on Mexico.

MAHAFFY (mą-hăf'fi), **John Pentland**, Irish teacher, born near Vevay, Switzerland, Feb. 26, 1839. He secured the principal part of his education in Germany, but later studied at the University of Dublin, and in 1867 became a teacher in that institution. His writings and lectures show a prolific fund of intellectual vigor, and occasioned the king of Greece to decorate him with the gold cross of the Order of the Saviour, in 1877. His writings embrace "Social Life in Greece;" "Kant's Critical Philosophy for English Readers;" "Alexander's Empire;" "History of Classical Greek Literature," and a translation of Fischer's "Commentary on Kant."

MAHAN (mą-hăn'), **Alfred Thayer**, naval officer and author, son of Dennis Hart Mahan, born in West Point, New York, Sept. 27, 1840. In 1859 he graduated from the naval academy at Annapolis, was assigned to duty in Brazilian waters, and returned to the United States at the beginning of the Civil War. He was promoted to a lieutenantcy in 1861, and served efficiently on various battleships. In 1865 he was made lieutenant-commander, became captain in 1885, and in 1896 retired from the service at his own request. President McKinley appointed him to serve as an American delegate to the peace conference at The Hague in 1899. Degrees were granted him by Yale, Harvard, Cambridge, and Oxford. Many of his writings have been translated into German, French, Japanese, and other languages. They include "Influence of Sea Power upon History;" "Interest of America in Sea Power;" "Life of Admiral Farragut;" "Life of Nelson;" "Influence of Sea Power upon the French Revolution," and "Lessons of the Spanish-American War."

MAHAN, Dennis Hart, soldier and teacher, born in New York City, April 2, 1802; died Sept. 16, 1871. In 1824 he graduated at West Point Military Academy, became an assistant professor of mathematics and engineering, and in 1826 went abroad to study military science for four years. He became professor of civil and military engineering at West Point in 1832, a position he held until his death, which resulted from drowning in the Hudson while suffering under temporary insanity. Among his books are "Industrial Drawing;" "Elementary Course of Military Engineering;" "Fortification Drawing," and "Stereotomy."

MAHANOY CITY (mā-hą-noi'), a town of Schuylkill county, Pennsylvania, situated in the anthracite coal region, about ten miles northeast of Pottsville. It is well connected by railways, has extensive iron works, and is important as a mining and shipping center for anthracite coal. The town has a large trade in coal and manufactures. It has a number of municipal facilities, several fine churches, and good schools. Population, 1900, 13,504.

MAHDI (mä'dē), the term applied by Mohammedans to the messiah that was promised by Mohammed, and who is expected to appear and fill the world with righteousness by effecting the universal adoption of Mohammedanism. The appellation was applied particularly to a successor of Mohammed named Abu'l-Kasim, the twelfth Imam, who disappeared mysteriously in 879 A. D. It was generally believed that he had gone to an unknown abode for the purpose of preparing a place for the righteous, and that he would reappear on the last day. Since then there have been many mahdis who claimed power and authority, the most prominent of recent times being Mohammed Ahmed. He was born in Dongola, Nubia, in 1842, and died of small-pox June 25, 1885. This mahdi took a course in Mohammedan theology at Khartoum and Berber, and retired to the island of Aba in the White Nile at the age of

twenty-five years, where he lived in studious solitude until 1882, when he proclaimed himself the messiah. The loose government of Egypt made it possible for him to raise a considerable army. With it he seized Kordofan in 1883, which he made his capital. In November of the same year he defeated an Egyptian army of 10,000 under Hicks Pasha, and in 1885 conquered Khartoum, where General Gordon was killed.

MAHMUD II. (mä-mood'), sultan of Turkey, son of Sultan Abdul-Hamid I., born July 20, 1785; died July 1, 1839. He ascended the throne on July 28, 1808, under Janizaries influence. Shortly after he became involved in a war with Russia, which lasted till 1812, and by the treaty of Bucharest lost Bessarabia and the provinces of Moldavia, Servia, and Wallachia. In 1821 Greece revolted. By the success in the battle of Nazarino, in 1827, that country became independent, but was not so recognized until three years later. While the Grecian war of independence was progressing, Mahmud made military reforms, and in 1826 was able to effect the destruction of the Janizaries. In 1829 a war with Russia terminated in the treaty of Adrianople, by which the Ottoman power was further curtailed in Europe. Shortly after Mehemet Ali, pasha of Egypt, began a war for independence, which was settled by a treaty in 1833 through the intervention of Russia, but neither of the contending parties was satisfied. In the same year Russia forced him to make the treaty of Unkiar-skelessi. Subsequently he effected many civil reforms and concluded a number of commercial treaties by which the foreign relations were greatly strengthened and commerce extended. In 1839 he sent an expedition against Mehemet Ali to restore lost power, but died before results were obtained.

MAHOGANY (mȧ-hŏg'ȧ-nў), a large tree of the order meliaceæ, common to tropical America, and noted for its close-grained and

MAHOGANY.
a, flower; *b*, partly opened fruit.

hard wood. The tree reaches maturity in a period of 200 years. It attains a height of fifty to ninety feet, with a diameter of from five to twelve feet, and has lofty and spreading branches. Its flowers are fragrant and the fruit is the size of a turkey's egg. The wood is one of the most valuable, being hard, reddish-brown, compact, and capable of taking a fine polish. It is useful in the manufacture of furniture, musical instruments, and for veneering. Sir Walter Raleigh brought the first specimens of mahogany wood to Europe, but its general use was not commenced till about 1725. Mexico, Honduras, and the West Indies are the countries where mahogany is produced most extensively. The term mahogany is often applied to any one of various trees yielding wood resembling the true mahogany.

MAHRATTAS (mȧ-rȧt'tȧs), a people of British India, who are supporters of the Hindu caste and religious systems, but are thought to be of Persian descent. The first mention of them in history occurred in the 17th century, when they came in contact with the Mongols, and in 1761 fought a series of battles against incursions of the Afghans. Their possessions extended along the western side of the peninsula. They were reduced to dependence by the British in the early part of the 19th century. Sindia was their last ruler, who held out against European conquest by employing French troops and discipline, but he was defeated in 1843 by the British. At present they do not support caste laws with much strenuosity, but are noted as Brahma worshipers of considerable earnestness.

MAIMONIDES (mī-mon'ę-deez), Jewish scholar and theologian, born in Cordova, Spain, March 30, 1135; died at Cairo, Egypt, Dec. 13, 1204. His father was a man of profound learning. He exercised much care in the elementary instruction of the son, who later was given a complete course under Arabic masters in philosophy, theology, and the science of medicine. In 1148 the Mohammedan invaders of Spain required both Jews and Christians to confess Islam or emigrate. Accordingly the Maimonides family emigrated to Egypt by way of Jerusalem. At Cairo the younger Maimonides became influential among the Jewish people, and also with the high officials, attaining to the highest position in Jewish worship and becoming physican to the sultan of Egypt. His writings are voluminous, embracing a systematic treatise of Jewish traditions and demonstrations of basic principles upon which Judaism rests. He was able to write in both Hebrew and Arabic. Many of his works have been translated into Latin and other languages. Among the principal works are "Complete System of the Talmudic Judaism" (in Hebrew), and the works in Arabic including "Compendium of Logic;" "Guide of the Erring;" "Exposition of the 613 Laws of Moses," and "Commentary on the Mishna."

MAIN, a river of south-central Germany, rises in the Fichtelgebirge. It has a general course toward the west, and joins the Rhine

near Mentz. The Main is 306 miles long, navigable about 200 miles, and affords connections with the Danube by Ludwig's Canal. Its valley is highly fertile, contains several prosperous cities, and is noted for the culture of cereals and the vine. Among the chief cities on its banks are Frankfort, Würzburg, Schweinfurt, and Offenbach.

MAINE, the most northeastern state of the United States, whose general boundary on the north and east is formed by British America, south by the Atlantic, and west by New Hampshire and Quebec. The length of the state is 302 miles; breadth, 275 miles, and the area, 33,040 square miles, about the size of West Virginia and Massachusetts. The Atlantic coast has a length of 220 miles, and is indented by numerous inlets, the most important being Casco, Penobscot, Bluehill, Frenchman, Machias, and Passamaquoddy bays. Through the center and along the western boundary are mountain groups, the latter including ranges of the White Mountains. The highest elevation is Mt. Katahdin, located in the north central part, and has an elevation of 5,385 feet. Other elevations of prominence are Saddleback Mountain, 4,000 feet, and Mt. Baker, 3,390 feet. There are not less than 1,560 lakes in the state, of which the more important are Moosehead, Chamberlain, Eagle, Milinokett, Grand, Sebec, Richardson, Sebago, and Rangeley lakes. The general slope of the surface is toward the south, and there are many streams which afford excellent water power. Among the more important rivers are the Penobscot, Kennebec, Androscoggin, Saco, Salmon Falls, Union, St. Croix, Machias, St. John, Alleguash, Carrabasset, and Aroostook. The state has copious rainfalls, and a climate cold and dry in the winter, but warm in the summer, the average temperature at Portland being 48°. Snow falls to considerable depths in the winter, but the excellent drainage renders the state one of the most healthful, malaria being of very rare occurrence.

The state of Maine has fine forests of spruce, hemlock, fir, and pine, all of which yield valuable timber. Among the agricultural products are hay, corn, potatoes, apples, wheat, barley, oats, rye, and buckwheat. The annual potato product is valued at $2,950,000; oats, $1,725,000; hay, $8,998,000; and barley, $188,000. It has large interests in the rearing of milk cows, other cattle, horses, swine, and sheep. However, the most important source of wealth is lumbering, the annual product of which is valued at about $18,225,000. There are productive mines yielding granite, graphite, silver, mica, feldspar, slate, lead, ochre, manganese, and coal. The manufactures are extensive, including principally lumber products, cottons, woolen and linen goods, boots and shoes, paper, leather, sailing vessels, machinery, and canned fish and fruit. Among the extensive coast fisheries are those yielding herring, mackerel, clams, sardines, lobsters, and many other valuable species, much of the product being cured and canned. Railroad lines are abundant in the southern and eastern sections of the state, embracing a total of 2,050 miles. The lakes abound in varieties of fresh-water fish. Many wild animals are still met with in the northern forests and plains, including minks, bears, deer, wolverines, and wild fowl.

The educational interests are well organized, including a splendid school system with articulated courses of study, and a nominal compulsory attendance law. Provisions have been made for maintaining grammar and high schools in all the towns and cities, and these carry courses designed to fit for higher work in colleges. The annual expenditure for educational purposes aggregates $1,600,000. Among the higher institutions are several normal schools, colleges, and universities, the list embracing both public and private establishments. The Maine State College of Agriculture and Mechanic Arts is situated at Orono; state normal schools at Castine, Gorham, and Farmington; Colby University, Waterville; Bowdoin College, Brunswick; Bates College, Lewiston; Maine Wesleyan Female College, Kent's Hill; and Westbrook Seminary for Women, Deering. It has efficient institutions for the care of unfortunates, the insane, deaf and dumb, and feeble-minded, and benevolent and correctionary institutions. The state prison is at Thomaston. There are 175 periodicals, of which about eighteen are dailies. Scientific and religious societies of various kinds are in a flourishing condition, all leading Protestant and the Catholics having valuable church homes and a large membership.

The Cabots visited the coast of Maine in 1497, being the first white men to explore that region after the discovery of America by Columbus. In 1524 Verrazano visited the coast of Maine, but the early attempts made by French, English, and Dutch to found settlements were unsuccessful. The first permanent English colony was established in 1607 by George Popham near the mouth of the Kennebec River, where also Capt. John Smith was located for a time. Sir Ferdinando Gorges obtained grants to territory between the Piscataqua and Kennebec rivers, and that part of Maine passed to Massachusetts in 1652. The duke of York came in possession of eastern Maine in 1664, which portion also fell to Massachusetts in 1691, while the whole of Maine remained a part of Massachusetts till 1820. On April 15, 1820, Maine was admitted into the Union as the twenty-third state, and its constitution formed at that time is still in operation. A dispute regarding the northeastern boundary led to the Ashburton treaty in 1842, though its boundary with Massachusetts had been settled in 1737. The Maine law prohibiting the manufacture and sale of spirit-

uous liquors was passed in 1851, but was further strengthened in 1858. Maine has considerable natural resources yet undeveloped, which are attracting the attention of both capitalists and laborers. It is popularly called the Pine Tree State. Augusta is the capital. Other cities of importance include Portland, Auburn, Biddeford, Lewiston, Bath, Rockland, Bangor, Saco, Belfast, Westbrook, Calais, Gardiner, and Waterville. According to the census of 1900 the state has a population of 694,466. This includes a colored population of 2,240, or only three per cent., of which 1,319 are Negroes, 798 Indians, 119 Chinese, and four Japanese.

MAINE, Sir Henry James Sumner, jurist, born in England, Aug. 15, 1822; died in Cannes, France, Feb. 3, 1888. He studied at Cambridge, was called to the bar, and became a professor of civil law at the Middle Temple, London, where he remained till 1862. From that year till 1869 he was attorney of the council for India, and in 1870 became professor of comparative jurisprudence at Oxford University, but in 1877 engaged at Cambridge as law professor. He became distinguished in making various reforms in the laws of India, and also because of his writings on institutional law. His most important works include "Village Communities in the East and West;" "Ancient Law;" "Early History of Institutions;" "Popular Government," and "Dissertations on Early Law and Customs."

MAINTENON (măn-tĕh-nŏn′), **Francoise D'Aubigne, Marquise of,** second wife of Louis XIV., born in Niort, France, Nov. 27, 1635; died at the School of St. Cyr, April 15, 1719. She was born while her parents were in prison, but after their release accompanied them to Martinique in the West Indies, where her father died in 1645, and shortly after she returned with her mother to France. Her friends provided for her education in a convent, where she was converted to the Roman Catholic faith at the age of fourteen, and soon after married the poet, Paul Scarron (1610-1660), who was then quite aged and deformed. At the death of her husband, in 1660, she was reduced to poverty, but was granted a pension and received charge of the two sons of Louis XIV., training them with much patience and tenderness. About that time she formed the acquaintance of Louis XIV., who became infatuated with her, and in 1685 contracted a private marriage with her, though he was only forty-seven, while she was fifty years of age. Ever after she remained his faithful assistant, but she was charged with taking an important step in securing the revocation of the Edict of Nantes, after which persecutions were directed against the Protestants. At the death of the king, in 1715, she founded a home for poor girls at St. Cyr, where she patronized art and literature, remaining there until her death.

MAINZ. See **Mentz.**

MAJESTY (măj′ĕs-tў), a title of kings, queens, and emperors, generally with the possessive pronoun, as, his majesty, your majesty; or in the plural, their majesties. The king of England is addressed directly as your majesty, and letters are addressed "To the King's Most Excellent Majesty." Various appellations were made to divers sovereigns at different times. "Most Catholic Majesty" was the former address applied to the king of Spain; "Apostolic Majesty" to the kings of Hungary, and "Most Christian Majesty" to the kings of France. "Imperial Royal Majesty" is a title now used in addressing the emperors of Germany and Austro-Hungary.

MAJOR (mā′jẽr), in military, the lowest in rank of the field officers, being classed below a lieutenant-colonel and next above a captain. In the absence of the lieutenant-colonel he discharges that officer's duty, his usual duties being to attend orders of superior officers, and to have charge of exercises of the battalion or regiment.

MAJORCA (mą-jôr′ką), the largest island of the Balearic group, in the Mediterranean Sea, and forming a part of the Spanish dominion. It has a length of fifty-seven miles; breadth, forty-five miles; area, 1,425 square miles, and a population of 231,890. The soil is generally fertile and the coast line irregular. At many places the shores are precipitous and lofty. Several railway lines connect different cities. The principal productions embrace fish, fruits, cereals, silk, hemp, cattle, and a number of minerals. Palma is the chief railroad and commercial town.

MAJOLICA (mą-jŏl′ĭ-ką), a species of fine pottery manufactured extensively in Italy from the early part of the 15th century. It is thought to have been produced first on Majorca, an island called Majolica in the Italian. It was made of coarse material and beautified with a plumbiferous glaze, but later a more beautiful stanniferous glazing was invented, by which the pottery was rendered more durable and of a more enameled-like appearance. Later beautiful paintings of ruby and golden tints were applied, which have been remarkable in preserving their appearance and mold. Within recent years it has become possible to reproduce this ware with much success, and vases, tablets, friezes, and flower pots are now made of it.

MAJORITY (mą-jŏr′ĭ-tў), the term applied to more than half of a given number or group, and used to designate the excess by which one group of things exceeds another group. In elections it is employed to qualify the amount more than one-half of the votes cast for all the candidates who stand for the same office, and differs from a plurality in that the latter designates the number by which the votes cast for one candidate exceed those cast for another, but not consti-

tuting a majority. Thus, fifteen is a majority of twenty, but nine exceeds six by a plurality of three. Majority is also used to designate full age; the age at which, by the laws of any country, persons become competent to manage their own affairs, which, in the United States and most other countries, is twenty-one years.

MALACCA (mą-lăk'ą), **Strait of**, an important channel between Sumatra and the Malay Peninsula, which connects the China Sea with the Indian Ocean. It is from twenty-five to 140 miles wide, about 475 miles long, and has a number of excellent seaports.

MALAGA (mäl'ą-gą), a seaport of southern Spain, capital of the Malaga province, on the Mediterranean Sea, seventy miles northeast of Gibraltar. It dates from the times of the Romans, when it developed a large commerce, and during Moorish occupation its dockyard and quay were improved materially, much of the works still existing. There are manufactures of cotton and woolen goods, leather, clothing, cordage, ironware, soap, and machinery. The export and import trade is very large, consisting principally in cereals, wines, salt, iron manufactures, and fruits. Its sugar manufacture and trade are especially noteworthy, and many millions of pounds are exported annually. The construction of railroads to interior points has given the city trade a vast impetus. Among its improvements are several public schools, important government buildings, and modern municipal facilities. It has a climate beautiful for its sunshine and healthful on account of its uniformity. Ferdinand and Isabella expelled the Moors from Malaga in 1487, since which time it has been a Spanish city. Population, 141,790.

MALARIA (mą-lā'rĭ-ą), a morbid poison originated in swamps or effluvia from the decomposition of vegetable or animal matter. The poison inhaled affects the system through the blood often as long as twelve months after one has been exposed to it, and in many cases exerts its depressive influence through life. It emanates most readily from marshy land under the influence of heat at 60° Fahr., but is not generated under thorough drainage, or when flooded or frozen. An elevation of more than 1,000 feet above sea-level is proof against malaria. The diseases arising from it include intermittent and congestive fevers, ague, and a class of yellow fever. Rice fields and marshy regions of tropical and semi-tropical countries are most commonly affected. The west coast of Africa and the Roman Campagna of Europe are noted malarial districts. In 1899 a valuable discovery was made in relation to the cause of human malarial fevers by Major Ross, who was stationed at Calcutta with the British army. With the aid of several physicians he found that mosquitoes fill themselves with infected blood of birds and other animals; then deposit their eggs and die near them. In this way the water becomes contaminated with the spores, is fed upon by the larvæ, or is drunk by man. The young mosquitoes, being infected with the disease, carry it to human beings, and also to the water and to other animals taken as food by man. As a means of protection against malaria plans have been devised to destroy the mosquito, which is done by fumes of tobacco, gases, odors of turpentine, garlic, and by pouring petroleum upon the surface of ponds and marshes where the insects breed and propagate their species.

MALAY ARCHIPELAGO (mą-lā'), the most important group of islands in the world, situated southeast of Asia, and known also as the Asiatic, Indian, or Eastern Archipelago. The island group lies between the China Sea, Pacific Ocean, Indian Ocean, Australia, and Malaya; the last named region does not belong to the group. Within the confines of the archipelago are thousands of islands, many of which are small, but all are more or less fertile and produce luxuriant vegetation. The principal islands include Java, Borneo, Sumatra, Celebes, the Philippines, the Moluccas, Bali, Madura, Banca, Timor, Flores, Billiton, Sumbawa, Lombok, and Ceram. This group includes many active volcanoes in different parts of the archipelago. Malays constitute the principal race, but there are various other races and a small per cent. of Europeans. The productions are largely tropical, embracing minerals, fish, tobacco, fine fruits, gum-elastic, coffee, tea, sugar, rice, timber, and various domestic animals. Holland has the principal possessions, to which the name Dutch East Indies is applied.

MALAY PENINSULA, or **Malaya**, a long, narrow stretch of land extending from Burmah and Siam, in Asia, in a general southeastern direction, and separated from Sumatra by the Strait of Malacca. Its eastern boundary is formed by the China Sea and the Gulf of Siam, and the Isthmus of Kra forms a connection with Lower Siam. The width is from twenty-five to 215 miles, and the area 73,500 square miles. It has extensive ranges of mountains, some of which lift their peaks from 5,000 to 8,500 feet above the sea. Dense forests cover the mountain districts and many of the lowlands, while the drainage is by numerous rivers. Its soil is exceedingly productive. Tin and other minerals abound, especially iron, coal, silver, and gold. The agricultural products include sugar, cotton, rice, yams, tobacco, pepper, and many varieties of fruit. Malays, Siamese, and Negritos constitute the principal native population, and a large per cent. of Chinese have settled in the region. The southwestern portion of the peninsula consists of British territory, to which the name Malacca is applied, and of which Malacca is the capital city. Independent chiefs still control large tracts under treaties

with Siam and Britain. The total population is estimated at 1,250,000.

MALAYS (mȧ-lāz′), one of the principal secondary races, closely allied to the Polynesian, and found largely in the Malay Peninsula, the Malay Archipelago, the island of Madagascar, and the islands of the Indian and Pacific oceans. The race is of low stature, less than medium weight, and bears some resemblance to the Mongolian, though the eyes are horizontal, the face flat, and the hair less coarse and straight. The beard is scant, skin varies from a clear brown to a dark olive, and the language is characterized by much phonetic and grammatical simplicity. Arabic characters were used in their writing until comparatively recent times, when the Roman system came into use. They constituted the best traders of the Malay Archipelago since the 13th century; engage in agriculture, rude manufacture, and build simple but fixed homes. According to their tradition and history they first occupied portions of Sumatra, where they established the state of Menangkabo, and thence spread largely to other sections, but at present they are tributary principally to Holland.

MALBONE, Edward Greene, painter, born in Newport, Rhode Island, in August, 1777; died in Savannah, Georgia, May 7, 1807. At the age of seventeen years he became a portrait painter in Providence, Rhode Island, but later practiced his art in Boston, New York, and Philadelphia. In 1801 he made a tour through Europe, settling after his return at Charleston, South Carolina. His productions in portrait painting are counted among the finest in America, one of his best works being the "Hours," in which three female figures represent the Present, Past, and Future.

MALCOLM, the name of four kings of Scotland, who reigned between 943 and 1165. Malcolm I. reigned from 943 to 954, and in his reign secured the cession of Cumbria from the English king, Edmund I., in 946. Malcolm II. became king in 1003, and died in 1033; Malcolm III. ascended the throne in 1056, and was slain in battle on Nov. 13, 1093; Malcolm IV. succeeded to the throne in 1153, and died Dec. 9, 1165, in his twenty-fourth year.

MALCOLM (măl′kọm), **Sir John,** soldier, author and statesman, born in Eskdale, Scotland, May 2, 1769; died May 30, 1833. In 1783 he went as cadet with the army to India, and while stationed near Madras devoted his leisure time to the study of Oriental languages. After serving as an interpreter with the Persian staff, he became ambassador to Persia in 1800, and three years later was made president of Mysore, in which position he rendered valuable service to the British. He returned to England in 1812, where he was knighted. In 1817 he became brigadier-general in the Indian army, and was governor of Bombay in 1827, but returned to England in 1830 to devote himself to literature. His writings include "Political History of India;" "History of Persia;" "Memoir of Central India," and "Life of Lord Clive."

MALDEN (mȯl′den), a city of Middlesex county, Massachusetts, on the Malden River, five miles north of Boston. It is well connected by railway and electric street car lines, has good schools, electric lights, a public library, and other municipal facilities. The manufactures are very extensive, embracing principally large quantities of rubber shoes, clothing, carpets, cordage, paper, leather, boots and shoes, and machinery. Population, 1900, 33,664.

MALDIVE ISLANDS (măl′dīv), a remarkable archipelago in the Indian Ocean, situated southwest of Ceylon, and extending a distance of 540 miles from north to south. It includes seventeen groups of atolls, most of which have a fertile soil, rich forests of palm and other trees, and produce tropical fruits and vegetation. Fish abound off the shores, while many varieties of birds are common. The inhabitants are governed by a sultan under a British protectorate. They engage chiefly in agriculture, and carry on trade relations with Ceylon, India, and other regions of South Asia. The island of Male, or Mohl, contains the capital, and is three-quarters of a mile wide by one mile long. Mohammedanism is the principal religion of the inhabitants, who number about 150,000.

MALHEUR (mäl-hēr′), a lake and river of Oregon. The lake receives the water from Silver River and several other streams, but has no outlet to the sea. It is about ten miles wide and eighteen miles long. The Malheur River rises in the vicinity of Malheur Lake. It has a general northeastern course of 175 miles, and flows into the Snake River at the boundary between Oregon and Idaho.

MALIBRAN (mȧ-le-brŏn′), **Marie Felicita,** noted singer, born in Paris, France, March 24, 1808; died in Manchester, England, Sept. 23, 1836. She was the daughter of a Spanish singer named Manuel Garcia, attained a reputation in Europe at an early age, and appeared successfully in New York City, where she married M. Malibran, a French merchant. Later she played and sang on the stage in France, Germany, Britain, and Italy, and, after being divorced from her first husband, married M. Beriot, a violinist, in 1836, but died soon after while attending a musical festival.

MALLERY, Garrick, soldier and ethnologist, born in Wilkesbarre, Penn., April 23, 1831; died in Washington, D. C., Oct. 24, 1894. He completed a course at Yale, secured a law degree at the University of Pennsylvania, and in 1861 enlisted in the Union army. He rose to the rank of lieutenant-colonel for valiant service, and in 1870 became brigadier-general in the regular

army. Subsequently he was placed in charge of the bureau of ethnology at Washington, in which he served with eminent success until his death. His writings include "Parallel in Planes of Culture Between Israelite and Indian;" "Calendar of the Dakota Indians;" "Sign-Language Among the North American Indians," and "Picture Writing of American Indians."

MALMO (mäl'mö), an important seaport city of Sweden, capital of the province of Malmohus, and situated across the sound from Copenhagen. It has a large number of important steamboat and railway lines, a growing commercial trade, and important manufactures of machinery, cotton and woolen goods, clothing, spirituous liquors, and wearing apparel. Its general facilities include a public library, electric railways and lights, and an excellent system of public education. The inhabitants are chiefly Lutherans. Population, 51,215.

MALONE (ma-lōn'), **Sylvester,** a clergyman born in Ireland, who came to the United States in 1838. He secured a liberal college education, was ordained to the priesthood of the Roman Catholic Church in 1844, and three years later became rector of the Church of Sts. Peter and Paul, Brooklyn, a position he held until his death. In 1894 he was made regent of the University of New York. Malone was intensely American, indorsed with vigor the public school system, and as a pulpit orator possessed marked ability. He died in Brooklyn, New York, Dec. 29, 1899.

MALPLAQUET (mäl-plä-kā'), a village in France, in the department of Nord, nineteen miles east of Valenciennes. It is noted as the scene of a battle on Sept. 11, 1709, in which the French under Marshal Villars were defeated by the Dutch and British under Prince Eugene and the duke of Marlborough. Each army consisted of about 100,000 men. The loss of each was nearly 20,000, but the victory of the allies was signal and resulted in the capture of Mons.

MALT, the name applied to grain that has been artificially germinated by moisture and heat. It is usually prepared of barley, which is steeped in water and fermented in order to convert the starch of the grain into saccharine matter, dried in a kiln, and then used in the distillation of whiskey, and for the manufacture of beer, ale, or porter.

MALTA (mal'ta), an island belonging to Great Britain, situated in the Mediterranean Sea, fifty-eight miles south of Sicily and 180 miles north of Africa. The Malta colony includes also Gozo, Comino, and several other small islands. Malta proper has an area of ninety-five square miles, Gozo about twenty, and the total colony 117. Several fine harbors are on the shore of Malta, that of Valetta being the best, and the colony includes one of the most important naval stations of Great Britain. Agriculture is the principal industry, yielding cotton, potatoes, corn, oranges, figs, and many varieties of tropical fruits. The manufactures embrace lace, cotton goods, clothing, matches, filigree, machinery, and utensils. It has an important commercial trade, Malta being a noted center for reloading and storage. A general public school system is maintained, and besides it are several business, professional, and industrial colleges, and a university. The language spoken is chiefly Arabic, since the natives are descendants from the Arabians, but Italian is also spoken by a considerable number.

The history of Malta begins about 1,000 B. C., when it was settled by Phœnician traders, but in 700 B. C. the Greeks conquered it. In 480 B. C. it fell to the Carthaginians; to the Romans in 216 B. C., and later was possessed by the Vandals and Goths. The Arabs conquered it in 870 A. D., and in 1814 it was recognized as a British dependency by the congress of Vienna. There are many interesting antiquities on both the islands of Malta and Gozo, which date from the early settlers, and many points of interest are shown to tourists in connection with the visit of St. Paul, who remained on the island of Malta a period of three months. The government is now administered by a resident governor. Roman Catholicism and Mohammedanism are the prevailing religions. On the islands are several railways, telegraph connections, many telephone lines, and in 1899 steamship communication was established between Malta and New York City. Valetta is the capital and most important city, having a population of nearly 50,000. The population of the Malta colony is very dense, including, besides the garrison of about 10,800, 180,550.

MALTA, Knights of, a religious and military order dating from about 1048, when it was founded at Jerusalem in a hospital dedicated to St. John the Baptist. It partook more largely of a military character some years after its organization, defended the Christian faith against the Moslem and other unbelievers, but began to decline after the Reformation. The Knights of Malta adopted the Maltese Cross, an eight-pointed figure, as their badge, and on it was the motto, "Pro fide," meaning for the faith. Several modern associations trace their origin to the Knights of Malta, among them the celebrated Red Cross Society.

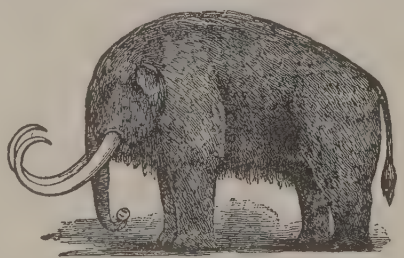
MALVERN HILL (măl'vern), **Battle of,** the last engagement of the Peninsular campaign. It occurred on July 1, 1862, and afterward General McClellan completed his change of base to the James River. Malvern Hill is a town of Virginia, about fifteen miles southeast of Richmond. After the battle of Frazer's Farm, McClellan with 85,000 troops took a strong position on the top of a plateau. The Union army was strongly intrenched behind fences, ditches, and hedges. Their batteries and infantries commanded the slopes, which the Confeder-

ates had to ascend to make an attack. It was planned to move in a uniform and concerted attack, but the Confederate army was distributed so General Lee's order could not be communicated promptly to the different lines, and consequently the attack was not simultaneous. The brunt of the battle was borne by Generals Magruder and Hill, who led charge after charge, but the heavy artillery fire made their efforts of no avail. Heavy firing continued until nightfall, when McClellan withdrew to Harrison's Landing, thus ending the Seven Days' battles. The loss on both sides was heavy, and the result was that the attempted capture of Richmond failed.

MAMELUKES (măm'ē-lūks), or **Mamalukes**, a term applied by the Arabians to the white slaves of Egypt, who were introduced originally into that country from Asia Minor in the 13th century. At first they were used as a mounted bodyguard of the sultan, but afterward became the regular cavalry of Egypt. They increased in power so rapidly that in 1254 one of their number became the sultan of Egypt, and the Mameluke dynasty ruled Egypt and Syria until 1517, when they were overthrown by Selim I. Though their government was marked more or less by violence and war, it is noted in history as the most enlightened since the time of the Pharaohs. Under their administration cities rose to much prosperity, irrigation canals were established, a postal system organized, manufactures encouraged, and many industrial arts promoted by the government. Both in Cairo and Alexandria are magnificent mosques that date from their time, while their works in metal, clothing, and utensils show them to have been both ingenious and enterprising. Even after their downfall, in 1517, they continued to be the virtual ruling class in Egypt, and in 1798 made a memorable charge upon Napoleon in the battle of the pyramids. Mehemet Ali, viceroy of Egypt, treacherously massacred 470 of the most important Mameluke princes in 1810, and soon after they practically disappeared from history. Mameluke is a term now applied in Turkey to a male servant, usually a Circassian slave.

MAMMALIA (măm-mā'lĭ-ȧ), the name given by Linnæus to the highest class of the animal kingdom, and which is now commonly employed by zoölogists to describe all those that possess mammæ, enabling them to suckle their young. The term is sometimes applied erroneously to all quadrupeds. This classification is incorrect for the reason that some amphibians, as frogs and newts, and some reptiles, as lizards and crocodiles, are four-footed, but they do not possess mammary glands; while, on the other hand, whales are not four-footed, but are allied to the warm-blooded quadrupeds, and like them bring forth their young alive and also suckle them. The term is therefore properly applied to all animals that have red, warm blood, and of which the female produces milk by the mammary glands, such as seals, bats, warm-blooded quadrupeds, and mankind. Mammals have skin covered more or less with hair, which ranges from spines and bristles to the finest wool and silky down. Lips conceal the mouth, and there are enameled teeth or equivalent bone formations. The skeleton agrees with that of man in having solid bones, or, when hollowed, the bones are filled with marrow, while the bones of the face are immovably fixed to each other, and generally there are five toes. Front limbs are present in all mammals, but in some species, as the manatees and dugongs, the hinder limbs are rudimentary or wanting completely. The respiration is by lungs; the diaphragm is complete, while the heart has two auricles and two ventricles. Different classifications have been made of mammalia by Linnæus, Cuvier, and other writers. The classification made by Cuvier contains seven orders, as follows: Bimana, Quadrumana, Carnassiers, Marsupialia, Rodentia, Edentata, Pachydermata, Ruminantia, and Cetacea.

MAMMOTH (măm'mŏth), the Russian name of the large extinct elephant closely resembling the Indian elephant, and of



MAMMOTH.

which fossil remains have been found in the northern part of North America and Eurasia. The first mammoth discovered was found in 1799 on the shores of the Lena River, where it was imbedded in ice, and since then many others have been discovered. In 1806 a mammoth in good condition was found enveloped in ice, which was afterward cut out and given a careful examination. The bones were not only intact, but the muscles, skin, hair, and internal organs were in a good state of preservation. Subsequently great numbers of bones and tusks have been taken from the northern coast of Asia, and from islands in the Arctic Ocean adjacent to Siberia. It is thought that the different species of the extinct mammoth elephant had an average height of about thirteen feet, a length of fifteen feet, and that its tusks extended outward in a curved form to the length of eight feet. The hairs were tufted and thick, about a foot in length, while a finer wool was underneath the outer points.

Writers generally agree in expressing the view that the average size of the mammoth was fully twice as large as the elephants now living. These animals lived before the glacial period, but also for long periods of time after. The early cave-dwellers of Europe utilized their tusks in making weapons and for engraving on them articles of ornament and utility. They were so abundant in Asiatic Russia that the fossil ivory found there has been an important article of commerce since the early part of the 19th century, though these remains were offered in the market as early as the 10th century. The extermination and disappearance of these species is assigned to changes of climate, but the disappearance of forests and the disadvantage of their great size in battling against flesh-eating animals and the advance of settlements are also set forth as probable causes. The remains of a mammoth found in 1846 had been inclosed apparently in ice immediately after death, and its flesh was in such a good state of preservation that it was utilized as food for dogs. The Russian government preserved some of the vital organs and the skeleton, which are now at the St. Petersburg Royal Museum.

MAMMOTH CAVE, a remarkable cave near Green River, about ten miles southwest of Louisville, Kentucky. It is formed in

EGYPTIAN TEMPLE IN MAMMOTH CAVE.

the limestone region, which stretches through Indiana, Kentucky, and Tennessee, covering about 6,000 square miles. Exploring parties have penetrated fifteen miles in the cave, but it is possible to travel through various chambers to a distance of about 175 miles. There is a connection between the Green River and the cave, since the water found in various parts of different chambers rises and falls in unison with that river. In the main it is dry, but there are several rivers and lakes, the largest of the former being Echo River, which is about three-fourths of a mile long and in places about 200 feet wide. The cave is well ventilated, and has many beautiful halls with stalagmite and stalactite formations. Some of the domes reach a height of 300 feet, notably Lucy's Dome and the Egyptian Temple. Several varieties of animals are native to the cave, among them rats, wingless beetles and grasshoppers, and amblyopsis fish, all of which are destitute of sight.

MAN, a term used to designate the human race, as distinguished from other forms of animal life. In zoölogy it is applied to a primate mammal, representing a special family of the genus Homo. It is recorded in Scripture that God created man in his own image on the sixth day of creation; that he was a creature little lower than the angels, but was driven from the Garden of Eden because of partaking of forbidden fruit, on account of which he became liable to death. It is further detailed that the duration of human life shortly after the expulsion from the Garden was nearly 1,000 years, but it was gradually curtailed on account of the wickedness of the antediluvian world until the limits which still continue were reached. By a plan of salvation man was given a Saviour, and those believing on him should overcome the evils of Adam's sin, thereby securing everlasting life of the material body after death. The Jewish race was selected as a special people by God, from whom the Saviour should descend, though there is some difference in opinion as to whether the Messiah has appeared, Christians holding that Jesus is the Saviour.

Darwin accounts for man's creation through a process of evolution from a species of mollusks belonging to the Ascidia; the line of ascent running thence through the lancelet fish, later through the ganoids and other fish; thence up through the amphibians, reptiles, and birds, thence the line of ascent is through the monotremata, the lowest mammals, the marsupialia, the placentia, the lemurs, the simiidæ, and the anthropoid apes. There has long been a discussion as to whether man constitutes one species with several varieties, or more than one species. The general view is that there is but one species, and that all varieties descended from a single parent stock. Blumenbach divided mankind into five races —the Caucasian, Mongolian, Ethiopian, American, and Malay; while Cuvier reduces them to three primary races, but mentions three secondary races. The primary races, according to Cuvier, are Caucasian, Mongolian, and Ethiopian; while the secondary embrace the Malay, American, and Australian.

Accredited writers generally agree upon the points of similarity between man and other animal forms, and also upon their differences. The points of similarity briefly stated include the functions of animal life and instinct; appetites, sensuous emotions, and emotional language; power of sensation and of faint reproductions in imagination; sensuous memory and dim sense-perceptions; power of organic interference, and organic volition. The points of difference that distinguish man from the mere animals are abstraction; intellectual perception; reflection; self-consciousness; intellectual memory; judgment; intellectual synthesis and induction; intellectual intuition; higher emotions or sentiments; rational language, and a true power of will. Man is also distinguished by his erect position, and in that he is tool-using. In the manufacture and use of tools he has undergone a series of marked progressions, the earlier consisting of flakestones and cracked bones. He is also the only living being that uses fire, though fire may exist without the productive energies of man in the form of volcanic action, spontaneous combustion, and lightning.

Many of the primitive tools of man have been found in caves and alluvial deposits along with the remains of tropical fauna, like the hippopotamus, elephant, and lion. Discoveries of this character have been made in continental Europe, from which it is taken that the climate of that part of the earth was at one time similar to the region of the equator. Geologists approximate the time at 50,000 years. That this long space of time has elapsed since man first left traces of his existence is verified by the remains of Arctic animals deposited above tools made by man, which have been found with the remains of tropical animals both in America and Europe. From this circumstance it is evident that the glacial period visited America and Europe after man had made considerable progress in constructing and using tools. Those holding this view generally agree that the days mentioned in the Scriptures as the distinct times for creating different objects and animals correspond to vast periods of time, thus establishing a fair agreement between science and the Biblical view of creation.

MAN, Isle of, an island in the northern part of the Irish Sea, about midway between Ireland, Scotland, and England. It has a length of about thirty-three miles, a breadth of twelve miles, and an area of 228 square miles. There is a chain of mountains stretching along the eastern shore, which has an elevation of about 2,000 feet; Snaefell, 2,024 feet high, being the culminating peak. Fully two-thirds of the surface is under cultivation, the principal agricultural products being wheat, oats, barley, rye, and fruits. It has mineral deposits of zinc and lead, and iron and limestone are also produced. The manufactures embrace machinery, cotton and woolen goods, utensils, wearing apparel, and earthenware. Welsh kings governed the Isle of Man from the 6th to the 9th century, when it came into the hands of the Scandinavians, but in 1266 it was ceded by treaty to the Scotch king, Alexander III. The government of Britain purchased the Isle of Man for $350,000 in 1765, and all special privileges were ceded by the duke in 1829. Local self-government has been granted, but it is under the supervision of the crown, and laws become effective only after publication. A Celtic dialect known as the Manx language is still spoken, but the English is understood by most of the people, and is coming gradually into use. Douglas, the principal seaport city, is the capital, and has a large railroad and steamboat commerce. There are railroad lines connecting it with Peel, Castletown, Ramsey, and other cities. A small island south of the Isle of Man is called Calf of Man. The population of the two islands is 60,125, of which about 20,000 reside in the city of Douglas, and fully 4,500 engage in cod and herring fishing.

MANAGUA (mä-nä′gwä), the capital of Nicaragua, in Central America, situated on a railway line near Lake Leon, and surrounded by a fertile region. Lake Leon, also called Managua, is about fifteen miles wide, forty miles long, and is connected by river with Lake Nicaragua. The city has a population of 21,750.

MANASSEH (mą-năs′seh), eldest son of Joseph, and progenitor of the tribe of Manasseh. This tribe numbered 52,700 when the children of Israel entered Canaan, and secured possessions tributary to the Jordan. Manasseh was also the name of a king of Judah, who ruled from 696 to 641 B. C. His idolatry caused the Hebrews much trouble, after which he was carried into Babylonian captivity, but subsequently was successful in securing his release through prayer.

MANATEE (măn-ą-tē′), or **Sea-Cow**, an animal native to the waters of South America, Australia, and West Africa. It is herbivorous, subsisting especially on sea moss and plants in shallow water. In many respects it shows affinity to the dugong.

MANATEE.

The body is from eight to twenty feet long; the skin is covered with grayish hair, and the tail broad and oval formed. The fore limbs are in the form of flappers, and are provided with a nail-like formation by which they are enabled to move along the shore. It is the custom of manatees to go in herds, but they are extremely inactive, and disappear in the water when danger becomes manifest. The mouths and estuaries of rivers are their favorite abode, where they are hunted for their skins, and also for their flesh and the oil derived from it. They are not afraid of man, and show considerable affection for their young. The manatee may be tamed in captivity.

MANBY, George William, inventor, born at Hilgay, England, Nov. 28, 1765; died Nov. 18, 1854. He took a special military training, served seven years in the militia, and about 1808 invented an apparatus for saving life in case of danger or shipwreck. Two years later he was awarded $10,000 by the house of commons in recognition of his invention, and, after making a number of improvements, he was voted a second award of $25,000. His invention consisted of a form of rope which could be shot from a mortar, and when passing through the air it could be seen by reason of a luminous attachment, thus making it possible to throw life-lines at night with assurance that they would be seen by those in danger. Fully 1,000 persons were rescued in shipwrecks by his inventions before his death. He published "Essay on Shipwrecked Persons" and "Practical Observations of Mariners."

MANCHESTER (măn'chĕs-tẽr), a city of Hartford county, Connecticut, five miles east of Hartford. It is conveniently connected by railways, has an electric street railway system, electric lights, city water, and a fine system of public schools. Its manufactures embrace woolen goods, paper, silk, needles, incandescent lamps, and electrical machinery. The city has a large trade in merchandise. Population, 1900, 10,601.

MANCHESTER, an important city of New Hampshire, in Hillsborough county, on the Merrimac River, forty-five miles north of Boston. It has manufactories that represent a capital of about $22,500,000, and employ 15,000 persons. The products embrace cotton and woolen goods, boots and shoes, machinery, locomotives, agricultural implements, carriages, and edged tools. Its public schools carry well articulated courses of study. It is also the seat of a state industrial school and a hospital. The city has an extensive electric railway system, waterworks, pavements, parks, and a public library of 35,000 volumes. It is the seat of many fine churches. Water power from the Merrimac is utilized in manufacture. The railroad connections are sufficiently extensive to make the city a convenient transportation center. Population, 1900, 56,987.

MANCHESTER, a city of Virginia, in Chesterfield county, on the James River. It is the focus of several railroads. The surrounding country is agricultural and contains productive coal deposits. Among the manufactures are ironware, cotton goods, flour, paper, machinery, furniture, oil, leather, ice, and hardware. In the vicinity of the city are large granite quarries. Within recent years a number of modern municipal facilities have been added, on account of which the city has enjoyed rapid development. Gas and electric lights, waterworks, pavements, and several fine schools are among the improvements. Population, 1900, 9,715.

MANCHESTER, an important commercial and manufacturing city of England, situated in Lancashire, on the Irwell River, thirty miles east of Liverpool. It has extensive railroad connections, modern municipal facilities, and is surrounded by a country noted for its productive manufacturing towns. On the opposite side of the Irwell River is Salford, with which it is connected by splendid railroad viaducts and a large number of bridges. The history of Manchester dates back to Roman occupation, when it was a base of military operations, and in the time of Edward III. became a manufacturing town. By the middle of the 18th century the factory system attained a foothold, and it was the first town of Britain in which this system developed. The Bridgewater Canal was constructed in 1576 for the purpose of making an outlet to the sea, and also establishing convenient connection with the coal and salt mines situated in Cheshire and Lancashire. Railroads were put in operation in 1830, but the Civil War in America interfered greatly with its cotton manufacture, since it cut off its supply. A fine canal and inland harbor were built in 1887-94, by which the foreign trade became vastly augmented, though this improvement cost fully $50,500,000.

The city of Manchester is beautifully built and contains much wealth. Among its fine buildings are the assize court, a fine specimen of modern Gothic; the town hall; the perpendicular Gothic cathedral erected in 1422, and Victoria University, an institution founded by John Owens with a bequest of $500,000, in 1846. The city contains several hundred churches, among them splendid specimens of Gothic architecture, representing the various leading Protestant sects. It also has a number of German churches, Jewish synagogues, and a Greek Catholic church. The educational institutions embrace high schools, professional and business colleges, industrial institutions, and several charitable and benevolent schools. The city has many educational and scientific societies, and a public library of about 200,000 volumes, these being distributed in several branches for convenient access. In 1887 the authorities erected a beautiful postoffice

in the Renaissance style at a cost of $500,000. Manchester has splendid parks, an electric street railway system, waterworks, pavements, gas works, electric lights, and numerous monuments, among them those erected in memory of Richard Cobden, Cromwell, Prince Albert, and other noted men of Britain. The manufactories represent a vast capital, and produce various products, among them cotton, woolen and silk goods, steamships, machinery, ironware, spirituous liquors, soap, chemicals, paper, edged tools, and musical instruments. The export and import trade is extensive, the clearing-house business for all purposes representing about $850,500,000 annually. Improvements in the city waterworks were made in 1894 at an expenditure of $20,000, and the supply is now drawn from the sea by means of tunnels and aqueducts, the amount consumed daily being estimated at 50,000,000 gallons. Population, 531,370.

MANCHURIA (măn-chōō′rē-ą), a territory occupying the northeastern part of China and whose northern boundary is formed by the Amur River, which separates it from Siberia. The total area is about 385,000 square miles, and the population is estimated at 7,500,000. It has three provinces named respectively Leaotong, Kirin, and He-Lung-Kiang. Shing-yang is the capital of Manchuria, and is situated in the province of Leaotong. The native race is made up of Manchus, but at present the Chinese predominate. Manchuria has a temperate climate; though severe in winter, it is healthful and favorable to various industries. The principal productions include wheat, millet, cotton, opium, tobacco, barley, lumber, and indigo. In 1900 the Russian government took possession of a number of ports and interior cities, with the view of controlling Corea and the Yellow Sea by an extension of the Trans-Siberian Railway. Subsequently Russia refused to evacuate, and in 1904 became involved in a war with Japan. Newchwang is the chief seaport.

MANDALAY (măn′dą-lā), capital of upper Burmah, situated near the Irawaddy River. In 1860 the king of Burmah transferred the seat of his government to Mandalay from Amarapura, since which time it has prospered remarkably, and in 1886 it was annexed to India by the British. The site of the city is on a fertile plain. It has excellent railway connections, manufactures of silk and other textiles, and is the attraction of many Buddhist pilgrims. Among the interesting buildings are the Aracan Pagoda, several government structures, and numerous mosques. Since British occupation there have been a number of floods and fires, but the city has been growing materially. Railroads, telephones, electric lights, and several fine schools and hospitals are among the improvements. Population, 190,135.

MANDARIN (măn-dą-rēn′), a general name for a Chinese magistrate. It is applied by Europeans to any public official of China, either civil or military. Khan is the Chinese equivalent, and implies a public official or character.

MANDOLIN (măn′dō-lĭn), a musical instrument resembling the guitar, and so called from its almond shape. It was first manufactured by the Italians, who now make several varieties, each with different tunings. The Neapolitan is considered the most perfect instrument of this class. It has four strings. The sound is made by a plectrum used in the right hand, while the strings are stopped on the fretted finger-board by the fingers of the left. The compass is about three octaves.

MANDRAKE (măn′drāk), a plant native to America and Eurasia, and which has a narcotic poison in all of its parts. Its root is fleshy, often forked, and described as resembling a human being in general outline. The leaves are lanceolate, beneath which are concealed several pale violet-colored flowers, with a purple bell-shaped corolla. Its fruit is a fleshy, orange-colored berry. The mandrake is gathered in Europe and northern Africa for the narcotic properties, which are utilized as a purgative, but its use among professional physicans has decreased materially.

MANDRAKE.

MANFRED, king of Sicily, son of Frederick II., born in Sicily about 1232; died in battle at Benevento, Italy, Feb. 26, 1266. His father died in 1250, and Manfred at once succeeded him as prince of Tarentum. He served as regent in Italy during the absence of his half-brother, Conrad IV. Later he became regent of Apulia, but continued opposition from the pope compelled him to take refuge with the Saracens. With their aid he defeated the papal army on Dec. 2, 1254, at Foggia. In 1257 he established absolute sway over Sicily and Naples, and in 1258 was crowned king of Palermo. Papal opposition continued, on account of which he invaded and conquered Tuscany, but the pope settled his dominions as a papal fief on Charles of Anjou, brother of the French king, Louis IX., and in a great battle that followed at Benevento he was slain while leading a charge. Manfred was an able warrior, skillful in tactics, and was universally regarded with admiration by his soldiers.

MANGANESE (măn-gą-nēs′), a metallic chemical element widely diffused, occurring chiefly as sulphide and carbonate and in the form of peroxide. It has a grayish-white color, but by being exposed to air readily

oxidizes, and also decomposes in water with an evolution of hydrogen. Extensive deposits are found in various countries, especially in Virginia, Arkansas, California, Spain, Moravia, and Germany. Manganese is serviceable under various conditions for numerous purposes, including its use in the manufacture of plate glass, bleaching powder, pottery, enamel, and for various purposes in analytical chemistry.

MANGO (măn'gō), a tree native to tropical Asia, but now naturalized extensively in America and other grand divisions. It attains a height of from thirty to fifty feet, grows rapidly, and has beautiful spreading, glossy foliage. The fruit is about the size

MANGO.

of a hen's egg, has a kidney-shape, and is used mostly for preserves, pickles, tarts, and as a dessert. The kernel of the fruit is nutritious, and is prepared for table use by cooking. Cultivation has greatly improved the mango until now its fruit is agreeable in flavor and highly luscious. About thirty species have been described.

MANGOSTEEN (măn'gō-stēn), a fruit native to the Molucca Islands, but now extensively cultivated in tropical Asia and various islands of the Pacific and Indian oceans. The tree attains a height of twenty feet, has a fir-like appearance, large oval leaves, and bears profusely. More than thirty species have been described. The fruit is shaped like an orange, similarly partitioned, and has a thick rind. It is a most delicious product. The mangosteen is cultivated for the market similarly to the orange.

MANGROVE (măn'grōv), a genus of tropical trees and shrubs that grow in muddy places on low coasts. It includes several well marked species, all of which send roots out from the main stem, though some varieties branch off from near the ground, while others send shoots from their branches into the ground beneath and form a peculiar and extensive cluster of vegetable growth. These trees resemble the banyan tree of India. They have a durable, dark red, hard wood useful in manufacture and building. The bark is utilized in tanning. The fruit has a pleasant, sweetish taste, is edible, and utilized in the production of light wine. In many of the marshy lands surrounding the mouths of rivers there are dense forests of mangrove trees, in which great numbers of wild animals and birds find shelter.

MANILA (mä-nē'lä), or **Manilla**, the most important city and seaport of the Philippine Islands, situated on Manila Bay, at the mouth of the Pasig River. It was founded in 1571 by the Spanish, who fortified the city in 1590. The river divides the city into two parts, separating Binondo from Manila proper, but there is convenient passage by a number of bridges. Manila has excellent railroad connections with Lingayen Gulf and interior points, while steamboat lines are maintained with the leading commercial centers of the world. The manufactures consist principally of tobacco, cigars, sugar, wearing apparel, machinery, earthenware, cordage, and utensils. Its exports include these articles of commerce and also rice, hides, mats, manila hemp, tree pang, leaf-tobacco, and fine lumber. Among the imports are spirituous liquors, ironware, lead, silks, and textiles. Several well improved streets with fine buildings make up the interior business portion of the city. In the suburbs are beautiful residences of wealthy merchants, but also in some portions blocks of inferior habitations. The principal streets are paved, have electric street railway lines, public lighting, waterworks, and sanitary sewerage. Its chief buildings include those erected by the government and a number of colleges. It also has several fine cathedrals and convents, public parks, a system of public schools, and several institutions of higher learning. Manila has long been important; several of its cathedrals date from 1690, but many of its buildings were destroyed by earthquakes and tornadoes. The most destructive hurricane visited it in 1882, when 3,850 houses were destroyed and many persons were killed. Admiral Dewey captured Manila for the Americans on May 1, 1898, by destroying the Spanish fleet in Manila Bay. The inhabitants consist chiefly of Tagals, Chinese, Spaniards, and a number of Americans. Manila proper has a population of 14,000, but with its suburbs, including Binondo, Tondo, San Jose, Santa Cruz, San Miguel, etc., it aggregates 310,000.

MANILA HEMP, the fiber of a tall perennial herb of the same genus as the banana and the plantain, which grow in some of the East India islands. It includes several species, such as the abaca, which has large dark-green leaves. The fiber is very valuable, the finer grades being used in the manufacture of scarfs, handkerchiefs, and other fabrics, while the coarser is employed in making cordage, such as rope, binding twine, and paper. Manila hemp is an important product in the Philippine Islands,

where the abaca grows to a height of fifteen to twenty feet.

MANISTEE (măn-ĭs-tē′), a city in Michigan, county seat of Manistee county, situated on Lake Michigan, at the mouth of the Manistee River. It is well connected by railroads, has electric lights and street railways, city waterworks, good schools, several hospitals, and an industrial home. There are manufactures of cigars, machinery, clothing, furniture, and utensils, but its salt works are the most important industry, producing annually 6,500 bushels. The surrounding country is agricultural and fruit-growing, and contains deposits of salt, some of which are fully thirty feet thick. It has a growing trade in merchandise. Population, 1904, 12,708.

MANITOBA (măn-ĭ-tō-bä′), a province of the Dominion of Canada, bounded on the north by Saskatchewan and Keewatin, east by Keewatin and Ontario, south by the United States, and west by Assiniboia and Saskatchewan. Its situation is nearly in the center of the continent of North America. The winters are cold and the summers warm. It has an area of 73,956 square miles, being somewhat larger than North Dakota. The surface consists mostly of a rolling prairie, but there are ranges of mountains in the northwestern portion. In winter the thermometer often registers 25° below zero, sometimes even 50° below zero, and the mean summer temperature is about 65°. The province has a large number of lakes, including hundreds of beautiful sheets of water, among them Lakes Winnipeg, Manitoba, and Winnipegosis. The drainage is toward the north into Hudson Bay, the principal rivers being the Assiniboin and the Red River of the North. Belts of timber extend along the streams, some of these being ten miles wide, and the soil is generally a rich black mold with a limestone subsoil. There are about 2,000 miles of railways, the different lines penetrating to the various commercial centers and the principal regions of production. Agriculture is the chief employment, the farms yielding wheat, flax, oats, hops, hemp, barley, potatoes, and various vegetables. Stock raising is combined with farming, this industry including the rearing of horses, sheep, cattle, and swine. The lake fisheries yield valuable quantities of herring, whitefish, and many different fresh-water species. Coal is the principal mineral produced at present, much of which is exported to the Northwest Territories. Game abounds in vast quantities, including many varieties of birds, foxes, deer, minks, and wolves.

The first permanent settlement in Manitoba was established at Selkirk, on the Red River, in 1812, but little progress was made in developing the resources until in 1868, when the district was transferred from the company having it in control to the government of Canada. However, the Riel rebellion broke out in the following year on account of dissatisfaction in regard to property titles, but Colonel Wolseley quashed it in 1870, and Riel was hanged. In 1878 railroad lines were extended into it from the United States, and the Canadian Pacific railway was built through it about the same time. There are yet vast opportunities for agricultural and business openings, the main interference with rapid occupation being its cold winters. In 1890 a system of public school education was established under a department; previous to that time the educational affairs were organized separately for Protestants and Catholics. Besides the common schools, there are collegiate institutions, high schools, a normal school at Winnipeg, and a university at Manitoba. The different churches and other interests support a large number of private institutions. Newspapers and periodicals embrace a total of seventy-five, twelve of which are issued daily. The government is administered under the dominion parliament and a local legislative assembly. Winnipeg is the largest city and the capital. Other cities include Portage la Prairie, Saint Boniface, and Brandon. The total population is 254,947, of which 22,170 are Indians.

MANITOBA, a large lake in the province of Manitoba, Canada. Its length from northwest to southeast is 120 miles, breadth from ten to thirty miles, and area 1,910 square miles. It discharges through St. Martin's Lake into Lake Winnipeg. The fisheries are important.

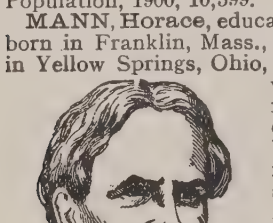
MANITOULIN ISLANDS (măn-ę-tōō′-lĭn), an island group in the northern part of Lake Huron, containing Drummond, Cockburn, Grand Manitoulin, Fitzwilliam, Lonely, and several other islands. The island group belongs to Canada, except Drummond Island, which forms a part of the state of Michigan. The islands are largely barren, but contain excellent fisheries. Drummond is especially noted as a favorite summer resort. The population of the entire group is 2,140, of which more than one-half are Algonquin Indians.

MANITOWOC (măn-ĭ-tō-wŏk′), a city of Wisconsin, county seat of Manitowoc county, on Lake Michigan, about 150 miles north of Chicago. It has important steamboat and railway lines, fine schools, and modern municipal facilities. The manufactures embrace glue, ironware, flour, machinery, leather, edged tools, and earthenware. It has a fine library, a modern courthouse, and excellent schools and churches. The city is surrounded by a fertile farming country. There is a large and growing trade in produce and merchandise. Population, 1900, 11,786.

MANKATO (măn-kā′tō), a city in Minnesota, county seat of Blue Earth county, on the Minnesota River, eighty-five miles southwest of St. Paul. It is at the junction of a number of important railroads. The city is

surrounded by a fertile farming country, and near it are several beautiful lakes. Among the manufactures are linseed oil, flour, cement, woolen goods, machinery, candy, packed meats, and earthenware. There are excellent public schools, a public library, and a state normal school. It has good municipal facilities, such as electric lights, waterworks, pavements, and street railways. Population, 1900, 10,599.

MANN, Horace, educator and statesman, born in Franklin, Mass., May 4, 1796; died in Yellow Springs, Ohio, Aug. 2, 1859. He was the son of a farmer in limited circumstances, but by perseverance managed to secure a good education. In 1819 he graduated from Brown University, studied law, and in 1827 was elected to the legislature of Massachusetts, where he took a decided position in favor of religious liberty and the construction of railways. He also led the movement to found the state lunatic asylum. Shortly after he removed to Boston, where he was elected to the state senate, serving in that body until 1837, and for a portion of the time was its president. In the latter year he was elected secretary of the newly appointed board of education, in which position he served until 1848, when he succeeded John Quincy Adams as a member of congress, serving in that body until 1852. The following year he became president of Antioch College, at Yellow Springs, Ohio, where he labored with much success until his death. Mann was distinctly practical; his educational theories and human sympathy give him a place among the most eminent educators of America. He was consulted in the establishment of schools, not only in his own state, but in many of the states of the central west, where he was called successively to lecture and devise plans for the building of educational institutions and the establishment of systems of schools. His writings are held in high esteem by educators, and are often quoted as authoritative on many important phases of educational and psychological questions. In struggling against sectarianism he wrested education from the hands of authority and placed it in the hands of science. His masterful plea in favor of trained and competent teachers led to the building of the American normal schools, which owe their existence to him. Among his writings are "Twelve Annual Reports," issued while secretary of the Massachusetts board of education; "Slavery: Letters and Speeches;" "A Few Thoughts for Young Men," and "Powers and Duties of Women."



HORACE MANN.

MANNA (măn'nà), a sweetish substance obtained from incisions in the stems of various trees or shrubs, especially the stems of the manna-ashes of southern Europe. The different species of manna-ash are cultivated largely in Calabria and Sicily, whence the largest amount of commercial manna is derived, though they are grown in plantations in other portions of Eurasia. In most cases the incisions are made about the first of August, and during warm weather the manna oozes from the cuts and forms hardened flakes or lumps that cling to the tree. Its taste is sweetish with a slight acridity, and the odor resembles that of honey. The best quality of flake manna comes from cuts made in the upper part of the stem. It has a pale-yellow color, is somewhat transparent, and consists mainly of sugar, mucilage, resin, sweet-gum, and not more than four per cent. of inorganic matter. There are other species of trees that yield manna, but the product differs somewhat in substance and consistency. The different varieties are used for food, but more particularly as an adjunct in cases of treatment by other medicines, the manna serving as a food for those constitutionally weak. The eucalyptus tree of Australia and several species of camel's-thorn found in Persia, Arabia, and Egypt yield a manna less nauseous than the manna-ash product. It is related in the Scriptures that the Israelites were supplied by God with a manna in the wilderness, while journeying to the promised land. The supply was furnished during the forty years spent in the Arabian wilderness, and this product has been identified with the saccharine substance produced by the plants of Arabia, since it is related that the manna of the Israelites melted when the sun became hot, and, if left to the next day, bred worms and stank. This class of manna is now secured from a kind of tamarisk, and eaten by the people of southwestern Asia in place of honey.

MANNHEIM (măn'hīm), or **Manheim**, a city of Germany, in the grand duchy of Baden, near the confluence of the Neckar and Rhine, about forty miles southwest of Frankfort. It is an important commercial city, has extensive docks, a good harbor, and important railroad connections. The manufactures embrace cotton and woolen goods, leather, machinery, paper, sugar, tobacco, chemicals, and musical instruments. It has statues of Schiller and Dalberg. The city has modern municipal facilities, including telephones, sewerage, waterworks, and electric street railways. It has excellent educational institutions, a botanic garden, a large public library, and numerous public buildings. Mannheim was founded in 1606, and became a part of Baden in 1801. Population, 80,265.

MANNING, Henry Edward, Catholic

cardinal, born in Totteridge, England, July 15, 1808; died Jan. 14, 1892. He graduated at Oxford College in 1830, was made rector of Lavington in 1834, and soon became noted as an eloquent minister of the Church of England. In 1851 he went over to the Roman Catholic faith, and after studying at Rome was ordained priest. He became archbishop of Westminster in 1865, advocated papal infallibility with much vigor, and in 1875 was made a cardinal. Besides taking an eminent part in Catholic church work, he advocated temperance reform, instituted parochial schools, and founded numerous charitable and benevolent institutions. His writings embrace "Gounds of Faith;" "True Story of the Vatican;" "Temporal Power of the Pope;" "Eternal Priesthood," and "Catholic Church and Modern Society."

MANSFIELD (măn'fēld), a commercial city of Ohio, county seat of Richland county, about sixty-five miles northeast of Columbus. It is extensively connected by railroads, has a large local and wholesale trade, and is the seat of a penitentiary. The general facilities embrace electric lights and street railways, pavements, a public park, and a library. Among its buildings are several fine schools, many churches, and a commodious courthouse. There are excellent educational institutions and many fine buildings. The manufactures include cotton textiles, furniture, woolen goods, farming machinery, paper, flour, carriages, and hardware. Population, 1900, 17,640.

MANSFIELD, Richard, actor, born on the German island of Helgoland, in the North Sea, May 24, 1857. His early youth was passed in the United States, but later he accompanied his mother, Madame Rudersdorff, to England, where he attended school, and made his first appearance on the stage in London. Later he returned to the United States, and since 1878 has been known as one of the most prominent actors of America, appearing in New York, Boston, and many other principal cities. His appearance was pleasing, particularly in "Mikado;" "Dr. Jekyll and Mr. Hyde;" "Scarlet Letter;" "Parisian Romance," and "Ten Thousand a Year."

MANSFIELD, William Murray, jurist, born in Scone, Scotland, March 2, 1705; died March 20, 1793. He studied at Oxford, where he secured a degree in 1730, and after studying law was called to the bar in 1731. He was elected to the house of commons in 1743, was made chief justice in 1756, and in the same year entered the house of lords and the cabinet. In 1776 he was made earl of Mansfield. His decisions and public addresses made him unpopular among the common people.

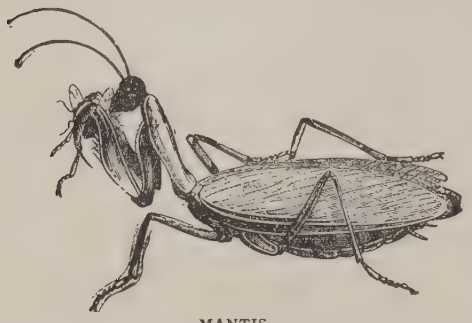
MANTEGNA (măn-tăn'yä), **Andrea**, noted painter, born near Padua, Italy, in 1431: died in Mantua, Sept. 13, 1506. He descended from humble parents, attended flocks of sheep during his boyhood, at which time he practiced the art of drawing from objects in nature. Later he was adopted by a tailor, under whose care he made a collection of paintings and sculpture. Subsequently he removed to Verona, but later secured engagements at Mantua, Rome, Venice, and Florence. His masterpieces include "Triumphs of Cæsar;" "Triumphs of Scipio;" "Defeat of the Vices," and "Parnassus." He also takes high rank as a frescoer of altar pieces in churches, and at Rome painted several noteworthy frescoes for Pope Innocent VIII. Several poems composed by Mantegna are extant, and he also made engravings on copper, some of which are still preserved. His influence on Italian art was marked, since he excelled in perspective, a line regarded of rare merit in his time.

MANTEUFFEL (măn-toi'fĕl), **Edwin Hans Karl, Freiherr von**, celebrated general, born in Magdeburg, Germany, Feb. 24, 1809; died in Carlsbad, June 17, 1885. He was trained especially for military activity, joined the army in 1827, and in 1854 was promoted to the rank of colonel. In 1857 he became head of the military bureau at Berlin, a position he held until 1865, when he was made governor of Schleswig. In the war of 1866 with Austria he took a prominent part in the battles of Langensalza, Verbach, Taubenbischofsheim, Helmstadt, and Rossbrunn, defeating the Hanoverians and Bavarians. He was commander of the first corps in the war against France in 1870, but was soon promoted to the command of the first army, when he won battles at Amiens and other important places. In 1871 he secured complete command of the army of the south, with which he made an attack on the French at Belfort and drove 80,000 men before him into Switzerland. After the peace treaty with France, Manteuffel became commander of the army of occupation at Paris. He was promoted to the rank of field-marshal in 1873, and in 1879 became viceroy of the new province of Alsace-Lorraine. His fidelity and ability in war made him one of the most efficient generals of the last century. To his superior tactics and strategy are due largely the success attending the military development and power of modern Germany.

MANTIS, a genus of locusts remarkable for their form. They are widely distributed in the United States and Eurasia. These insects include several species, most of which are noted for the large spinous forelegs, which appear as if folded for prayer when waiting for the insect prey. They resemble in appearance and color the plants and trees they frequent, by which they are able to elude observation. They feed on other insects. The different species are found most generally in tropical regions, where they attain to a length of two and a half inches, and their pugnacious habits

cause them to be kept by Chinese in cages to fight against each other.

MANTUA (măn'tū-ą), a city of northern Italy, situated about twenty-five miles south of Verona, on the Mincio River. It was



MANTIS.

formerly a city of Lombardy, forming the capital of the duchy of Mantua. The city is strongly fortified, is connected with several railway lines, and has a considerable trade in merchandise. The streets are regular, have pavements, several large squares, and are improved by modern facilities. There are manufactures of various kinds, and a considerable business enterprise, most of which is under the influence of Jews. The city dates from the Etruscans, having been founded earlier than Rome, and during the long period since has been a point of contention by the Romans, Ostrogoths, Lombards, Germans, French, and Italians. Pietole, a suburb, is thought to be the birthplace of Virgil. The city has many fine churches, the Cathedral of San Pietro, a number of educational institutions and a museum in which many master productions are preserved. Population, 28,641.

MANURE (mą-nūr'), any substance that may be utilized for accelerating vegetation or increasing the production of plants. The constituents of the soil necessary to plant growth are exhausted by continuous cultivation of plants, and it becomes necessary to replace them by the addition of manure. The soil absorbs air-food naturally to some extent. There is also a decomposition of some waste material, such as stubble, roots, and foliage left on the land, and more or less decomposition of mineral matters. However, this is not sufficient to maintain fertility for long periods. Besides, various plants require different kinds of substances to mature, for which reason it is beneficial to change the classes of plants cultivated from time to time, such as alternating corn, wheat, oats, grasses, and different crops. Experience has demonstrated that the best of soil even under a rotation of crops will not bear abundantly without limit, the yield gradually decreasing; thus it becomes necessary to place manure fertilizing to maintain the virgin fertility.

The substances used most commonly for fertilizing include the stable manures, such as are formed of the excrements of animals, as the dung of cattle, horses, swine, sheep, and poultry. Commercial fertilizing consists largely of guano, seaweed, refuse of fish, sewage of cities, and artificial saline mixtures, such as ammoniacal salts, phosphoric acid, and phosphates. Dust made from the bones of animals is also utilized to a considerable extent, particularly in floriculture and horticulture. The stable manures are spread over the surface of the cultivated lands, and afterward plowed under, while the phosphates, bone dust, and other powdered fertilizers are usually drilled in with the seed. In the Mississippi valley it is possible to maintain fertility by rotation of crops in connection with rearing stock and utilizing all the manures forming naturally. This is true of other sections of the United States, but in regions having a thinner soil it is quite necessary to use commercial fertilizing, else the cultivation of the land ceases to be profitable.

MANUSCRIPT (măn'ū-skrĭpt), a book or paper written by hand, as distinguished from one that is printed. The term is applied to all classes of writing, whether on paper, parchment, or any other substances. Before printing was invented, the manuscripts were generally written on papyrus, parchments, leather, or vellum, and were formed into a roll or made into a book, when they were called respectively volumen and codex. The oldest manuscripts extant are now preserved in Paris, and were taken from a tomb built by the eleventh dynasty of Egypt. They are written on papyri, and computed to be nearly 4,000 years old. Manuscripts of later dates are very numerous, including writings in the Egyptian, Babylonian, Jewish, and Grecian, besides many others. The science of paleography includes the decipherment and proper use of these manuscripts.

The manuscript writings are the forms in which the knowledge of the ancients was preserved. They comprised the only class of writings of which the great libraries of the ancients were constituted. The art of illuminating manuscripts with miniature and ornaments dates from remote antiquity. Vignettes or miniatures are attached to chapters of the Egyptian papyri that date from the eighteenth dynasty, and are painted in primary colors or designed in black outline. The Greek and Roman manuscripts were largely plain, but those dating from the 4th century A. D. are ornamented in art of the Byzantine style, and some of them bear portraits ornamented in the vignette style. The practice of making large capital letters at the beginning of chapters originated with the ancients, and was carried through the centuries even long after the invention of printing. In the larger museums of London, Paris, Rome, Berlin, and Vienna are specimens of manuscripts of

different centuries, the collections including various styles of material and designs in finish.

MANZONI (män-dzo'nee), **Alessandro**, novelist, born in Milan, Italy, March 8, 1784; died there May 22, 1873. He descended from noble parents, received a liberal education, and early developed an inclination to literature. In 1806 he published a noted essay on poetry, and four years later completed an edition of "Sacred Lyrics" that met with much favor. His novels are largely of a historical character, and attracted attention in France and Germany. Goethe was a studious critic of his works, many of which were translated into the German, French, and other languages. In 1823 he published an ode to Napoleon, which contains noble thoughts in splendid diction and embodies an account of the achievements of that great leader. The closing years of Manzoni's life were spent in devout seclusion, though he continued to write until a few years before his death. Among his works are "The Betrothed Lovers" and "History of the French Revolution."

MAP, a representation, usually a plane projection, of the whole or a part of the earth's surface. The surface of the earth being curved in every direction, it is impossible to represent correctly outlines, distances, directions, and proportions of its features except upon surfaces similarly curved. For this reason it is possible to indicate the location of features of the earth's surface with much better effect upon a globe. But as globes are too bulky to be moved about conveniently, and also too small to admit of the representation of minute details, it is found much more convenient to make representations of the earth upon plane surfaces, like the pages of a book. That a map on this plan cannot be made accurate may be proven by endeavoring to spread a plane projection upon a globe, which cannot be done without wrinkles, nor can the paper covering of a globe be laid flat without stretching or tearing. However, it is possible to color maps so as to show depressions and projections in the surface, and to represent by curved lines the different degrees of longitude and latitude. Besides, it is quite satisfactory to represent by color and lines the mountains, countries, lakes, rivers, oceans, cities, thermal relations, amount of rainfall, languages spoken, productions, and various other matters. The different classes of maps include political, meteorological, relief, hydrographical, geological, contour, historical, ethnological, and statistical. In geographical projections latitude is designated by number north and south from the equator, and longitude east or west of a standard meridian. The conventional meridian in the United States is fixed at Washington; in England at Greenwich; in France at Paris; in Germany at Berlin, and similarly in other countries. Nearly all the larger maps published in the United States give the distance east or west from both Washington and Greenwich. All standard maps are made on a given scale of miles to the inch, the scale being published on the map, thus enabling the student to make comparisons and estimate approximate distances by means of the scale.

As far as known, it is believed that the Egyptians were the first makers of maps, the earliest dating from Sesostris, about 1618 B. C., who represented his conquests on tablets that the people might study the advantages gained by military activities. The Grecian Anaximander prepared a map of the whole world as known in 560 B. C., while Ptolemy made a stereographic projection about 150 A. D. Gerhard Mercator (q. v.) is the best known of modern map-makers, and in the latter part of the 16th century prepared his projection that represents the earth on a map in which all the parallels and meridians are straight lines, and which is still used extensively in most of the modern school books. Maps of practical accuracy were not made until the latter part of the last century, since actual surveys of the earth's surface are necessary to reach a state of high perfection. Many of the maps now published of some of the grand divisions are quite deficient topographically. See **Chart**.

MAPLE, a class of trees belonging to the genus acer, containing about eighty species, all of which are confined to the north temperate zone. About ten of the species are native to the United States, but others have been introduced from Eurasia for ornament or for shade. The principal species of maple found in the United States are hard, bird's-eye, white, red, black, striped, California, mountain, and soft maple. Of these the hard maple is the principal source of maple sugar. It is a hardy tree of slow growth, attains a height of from twenty-five to one hundred feet, and yields from fifteen to

HARD MAPLE.

thirty gallons of sap annually, which is obtained by boring a hole in the wood of the tree in the spring about a foot above the roots, and inserting a spout to convey the juice into a vessel placed below for its reception. On boiling down the liquid, about three or four pounds of dark-colored crystalline sugar is obtained. A sap quite similar, but less sweet, is obtained from the soft maple.

The bird's-eye maple is the most valuable for cabinet work, while the soft maple is planted extensively in the United States as a rapid-growing ornamental shade tree. The mountain maple is a tall shrub with terminal clusters of green flowers, and is a favorite in some localities as an ornamental tree. The two principal varieties of Europe are the sycamore and the field maple, the latter being valuable for its wood in manufacturing furniture, musical instruments, and household utensils. Japan maple, the Norway, and the Tatarian are other foreign species of much value. The soft maple and many other species bear large quantities of seeds that usually develop in pairs, each having a fleshy seed formation at one end and a fan-shaped extension, the whole being two and a half inches long. Hard maple trees bear a similar seed, which is somewhat smaller. They are particularly numerous in New England and in the Mississippi basin, where vast quantities of maple sugar are manufactured. The flowers of nearly all species are of much value in supplying food for bees.

MARACAYBO (mä-rä-kī'bō), or **Maracaibo**, a gulf, lake, and city of Venezuela. The gulf is an extension from the Caribbean Sea connecting with Maracaybo Lake, a body of water one hundred miles long, and from forty to seventy-five miles wide. The gulf narrows down to a neck thirty-four miles long and ten miles wide, but the largest class of vessels cannot enter on account of sandbars shifting continuously. In 1499 the gulf and lake were discovered by Rodrigo de Bastidas. These waters contain many species of valuable fish. Their banks are low; the water is fresh, and the surface is not affected by tides. The city of Maracaybo is situated on the western shore of the strait, about twenty-one miles from the sea. It contains fortifications and various manufactures, and is a central export city for coffee, cocoa, cotton, hides, and tropical fruits. Population, 45,228.

MARAJO (mä-rä-zhō'), or **Joannes Island**, a body of land situated between the estuaries of the Para and Amazon rivers. It belongs to the province of Para, Brazil, and contains an area of 17,850 square miles. In the east and south are dense forests, and in the north fertile plains, on which large herds of cattle are reared. The population is 20,500, most of whom are Indians.

MARAT (mä-rä'), **Jean Paul**, eminent revolutionist, born at Boudry, near Neuchatel, Switzerland, May 24, 1744; slain July 13, 1793. He secured a liberal education, took a course in medicine at Paris, and previous to the revolution spent a number of years in foreign travels, visiting Amsterdam, Edinburgh, Dublin, Hamburg, London, and other cities. While at London he prepared several treatises on scientific subjects and medicine, and supported himself largely by these and by public lectures. He became court doctor in France in 1777, and the following year published a treatise on light, heat, and electricity, which attracted the favorable attention of Benjamin Franklin and Goethe, but it was adversely criticised by Newton. In 1788 he founded his famous "Publiciste Parisien" for the purpose of supporting the revolution, and later changed its name to "Journal de la République Française." This journal became the organ of the societies favoring the revolution, and in it the king and his supporters were denounced vigorously.

The better class of French people began to look upon Marat as a demagogue, but the radical party rallied to his support, thus making him both powerful and dangerous. To avoid destruction his printing presses had to be concealed from the authorities, and he himself escaped safely several times by fleeing to England or hiding in secluded places of Paris. After the republic was established, he was chosen to positions of honor, but was opposed by many of the leading republicans. On May 31, 1793, he issued an address as president of the Jacobin Club, in which he called on the people to slay all traitors and to demand their rights in government by insurrectionary movements. He pointed out that at least 270,000 persons ought to be executed to obtain proper government in France, and gave warning that he would demand the execution of more unless his request received favorable attention. The revolutionary tribunal placed him on trial for inciting disorders, but he was acquitted after some delay. On July 13 Charlotte Corday assassinated him because her lover had been slain by a mob, but was herself guillotined. The remains of Marat were placed in the Pantheon on Nov. 4, 1793, but four days later were removed, and his picture was taken from its place in the convention, where he was universally detested.

MARATHON (măr'ą-thŏn), an ancient village of Greece, about twenty miles northeast of Athens, the site of which is now occupied by Vrana. It is noted in history for the celebrated battle fought there on Sept. 28, 490 B. C., which Creasy considers one of the decisive battles of the world. The Persians were led by Darius, numbering 110,000 men, while the Greeks under Miltiades included an army of 10,000. The latter were reënforced by 1,000 Platæans with heavy arms, which inspired Miltiades to attack the Persians with great vigor. He

succeeded in defeating the enemy with a loss of 6,400, while the Greeks lost only 195. The result of this battle preserved the independence of Greece, but, if the Athenians had been defeated, Persia would have made all of Greece tributary.

MARATTI (mä-rät'tee), **Carlo**, painter, born in Camerino, Italy, in May, 1625; died Dec. 15, 1713. He studied under Andrea Sacchi, produced many noted works of art, and was employed by a number of popes from Alexander VII. to Clement IX. Clement XI. created him a knight of the Order of Christ, and Louis XIV. selected him as his court painter. His works include a restoration of the Raphael frescoes in the Vatican, several Madonnas, and "The Baptism of Jesus Christ."

MARBLE, a name applied to any limestone that is sufficiently hard to take a fine polish. The species of value for building or ornament are composed mainly of calcium carbonate or of calcium and magnesium carbonate. The colors of marbles range from pure white through all shades of gray to black, while violet, red, drab, yellow, pink, and green are also abundant. Gray and black colors are due to carbonaceous matter, and the others mainly to iron oxide. Excellent marbles are secured from some of the fossiliferous limestones, such as are taken from the carboniferous formations, and these are colored various shades of gray. Good marbles are also secured from non-fossiliferous crystalline formations, these consisting mainly of sedimentary calcareous strata, which are altered by metamorphism. The purest classes of marble are used for statues, while others serve for building material. Magnificent marble of various colors is obtained from the Grand Cañon of the Colorado, but there are quarries of more or less value in many portions of the United States. The marble used by ancient masters in sculpture came largely from the Parian and Carrara quarries, which produced species of very excellent quality. An abundance of fine material is still obtained from these regions.

MARBLEHEAD, a city of Essex county, Massachusetts, about eighteen miles northeast of Boston. It has good railway connections, electric lights, a street railway system, paving, public parks, and a library of 15,000 volumes. The important industries embrace seed-growing, shoemaking, and fishing. There is a considerable trade in merchandise. The city dates from the colonial period, and furnished 1,440 men for the Revolution. It has good schools and is noted as a summer resort. Population, 1900, 7,582.

MARCELLUS (mar-cĕl'lus), **Marcus Claudius**, Roman general, noted as the conqueror of Syracuse, born about 268 B. C.; killed in 208. He descended from a plebeian family. In 222 he became consul, and proceeded to Gaul, where he defeated the Insubrians, slaying their king in the contest. Subsequently he marched against Hannibal, and was the first Roman to successfully oppose that warrior in the Second Punic War. In his second consulship he led an expedition against Syracuse, which he conquered in 212 B. C., and soon after established Roman supremacy in all parts of Sicily. In 208 B. C., while serving for the fifth time as consul, he marched against the Carthaginian forces under Hannibal, but was slain in an ambuscade before attaining material results.

MARCH, Francis Andrew, philologist, born at Millbury, Mass., Oct. 25, 1825. In 1845 he completed a course at Amherst College, where he served as instructor for two years, and in 1850 was admitted to the New York bar. He became professor of comparative philology at Lafayette College, Easton, Penn., in 1858, and made a special study of the Anglo-Saxon language. The American Philological Association selected him as president in 1873, and subsequently he served on several important committees for the purpose of revising English spelling. In 1879 he directed the work in America for the "Historical Dictionary of the English Language," a celebrated publication issued by the University of Oxford, England, and in 1895 he had charge of the philological department of the "Standard Dictionary." His publications embrace "Relation of the Study of Jurisprudence to the Origin and Progress of the Baconian Philosophy;" "Introduction to Anglo-Saxon;" "Philological Study of the English Language," and "Greek and Latin Writers."

MARCHAND (mar-shŏn), **Jean**, soldier, born in Thoissey, France, Nov. 22, 1863. He joined the army in 1883, but attended the military school of St. Maixent most of the time till 1887. Two years later he went to West Africa for the purpose of aiding in exploring the Niger, and subsequently filled several important missions in relation to the extension of French influence in Africa. In 1895 he conceived the plan of organizing an expedition to proceed from the coast of French Congo to the Upper Nile, and two years later received command of an expedition to attempt that enterprise. Accordingly he ascended the Congo and the Ubangi rivers, established Fort Desaix near the confluence of the Suah and Uau rivers, and in 1898 occupied Fashoda. An international question was raised on account of the occupation of Fashoda, but France soon after abandoned the claim to England, and Marchand

JEAN MARCHAND.

proceeded to Abyssinia, reaching there on March 11, 1899. The exploits during the expedition gave much valuable information regarding the interior of Africa, and enabled France to outline more definitely its sphere of influence. Subsequently he held several important commands in the army of France.

MARCONI (mär-kō'nĭ), **William**, engineer and inventor, born near Bologna, Italy, in 1875. He studied under Professor Rosa at Leghorn, and subsequently at the University of Bologna. While at the latter institution he began to develop material results in wireless telegraphy, and later settled on his father's estate at Bologna to carry on practical tests in the application of electricity. In 1896 he conducted successful experiments in wireless telegraphy between Pernath and Weston, England, and subsequently sent messages from Rome to a vessel about nine miles from the shore, but later perfected his instrument to induce and receive messages a distance of several hundred miles. In 1897 he established an experiment station on the Isle of Wight, and there completed apparatus by which messages have been sent and received at long distances. Marconi has thus far been the most successful in producing appliances to solve the problem of wireless telegraphy.

WILLIAM MARCONI.

MARCO POLO. See Polo.

MARCY (mär'sĭ), **William Learned**, statesman, born in Southbridge, Mass., Dec. 12, 1786; died at Ballston Spa, New York, July 4, 1857. He studied in the public schools, and in 1808 graduated at Brown University. Subsequently he studied law in Troy, where he was admitted to the bar. He served with distinction in the War of 1812, was elected by the democrats as judge of the state supreme court in 1829, and was United States senator in 1831-32. While in the senate he originated the well known statement, "To the victors belong the spoils." He resigned his seat in congress to serve as governor of New York in 1833-39, was secretary of war under Polk in 1845-49, and secretary of state under Pierce in 1853-57. His service in the portfolio of state became distinguished by a controversy with Austria on the right of expatriation, and by reason of his ability as a diplomat and statesman.

MARDI GRAS (mär'dē grä'), a term meaning Fat Tuesday, and applied to a carnival celebrated annually on the day before Ash Wednesday in New Orleans and other southern cities of the United States. The festival occurs at the same time as Shrove Tuesday, a day celebrated in England. Festivals of revelry and merrymaking were observed at that time of the week in many European cities for several centuries. The practice was first introduced in America by creoles, in 1827, and since then has been a delightful and popular pastime among the people of many communities.

MARENGO (mą-rĕn'gō), a village near Bormida, northern Italy, in the province of Alessandria, and noted for a decisive battle on June 14, 1800. The Austrian army of 32,000 was led by General Melas, and the French forces of 23,000 by Napoleon, but the latter were victorious, the Austrians losing about 9,000 in prisoners and killed, while the French loss was 7,000. An armistice followed, by the terms of which the Austrians gave up all their fortified places in Italy west of the Mincio River.

MARGARET (mär'gą-rĕt), **St.**, queen of Scotland, daughter of Edward the Atheling, born in Hungary in 1046; died in Edinburgh, Scotland, Nov. 17, 1093. In the spring of 1069 she married Malcolm Canmore, king of Scotland. Her influence did much to extend civilization and Christianity, and, besides founding a church in Dunfremline, she disseminated Christian practices and made that faith strong with the common people. Pope Innocent IV. made her a saint in 1250. She was the mother of nine children, her youngest son being David I.

MARGARET, queen of Denmark, Norway and Sweden, born in Copenhagen, Denmark, in 1353; died Oct. 28, 1412. She was the second daughter of Waldemar III. of Denmark; became the wife of Hakon III., king of Norway, and at the death of her father, in 1375, became regent of Denmark for her son Olaf, who died in 1387. At the death of her husband, in 1380, Margaret had become queen of Norway, and at the death of her son she was made the sovereign ruler of Denmark. The success of her government endeared her to the people, but she convened a landthing, or congress, and with the consent of her constituents named her grand-nephew, Eric of Pomerania, as successor, though she remained as regent during his infancy, and even afterward had full control on account of his incapacity. About the same time overtures were made to her by the dissatisfied subjects of Albert, king of Sweden, but that sovereign resisted a union. Accordingly an army of invasion entered Sweden, took Albert and his principal supporters prisoners, and in 1397 united the kingdoms by a bond of perpetual union and peace, under the famous Calmar Compact. Subsequently the dominion was extended over Finland and Lapland, and the long desired object of uniting all Scandinavian people under one compact government was reached. Margaret died after a successful reign of thirty-seven years, but soon after the work of unison effected by

her was destroyed by internal discord. Margaret became known in song and oratory as the "Northern Semiramis."

MARGARET OF ANJOU, queen of England, wife of Henry VI., born in Lorraine, France, March 23, 1429; died Aug. 25, 1481. She was the daughter of René of Anjou, the titular king of Sicily, and of Isabella of Lorraine, and married Henry VI. of England in 1445. The weak character of the king made it necessary for her to act in directing many of the affairs of state, out of which grew jealousy on the part of the English people against France. The strife between the two nations resulted in England losing all its possessions acquired in France, except Calais, on account of which the duke of York, who claimed the English throne, and his followers plunged the country into a civil war, known as the Wars of the Roses. The struggle ended in 1471, and Margaret was kept a prisoner in the Tower for five years, when she was ransomed by Louis XVI. for 50,000 crowns. Her husband died or was murdered in the Tower, while her son was cruelly deprived of his life by his royal victor.

MARGARET OF VALOIS, queen of Navarre, sister of Francis I. of France, born in Angouleme, France, April 11, 1492; died Dec. 21, 1549. Her training was administered with much care at the court of Louis XII., and her intellectual strength and personal charms made her extremely popular. In 1509 she married the duke of Alençon, who died in 1525, and two years later she became the wife of Henry of Navarre. Her influence was cast in favor of developing industrial arts, learning, and commercial enterprises, a task for which her culture and wisdom gave her particular fitness. She published "Marguerites de la Marguerite des Princesses;" a collection of tales called "Heptameron," and several volumes of poems. Her only child was Jeanne d'Albert, who became the mother of the French king, Henry IV. The latter was the founder of the royalty of the house of Bourbon.

MARIA CHRISTINA (mä-ree'ä krĭs-tee'nä), queen of Spain, daughter of Francis I., king of the two Sicilies, born in Naples, Italy, April 27, 1806; died at Le Havre, France, in August, 1878. She became the fourth wife of Ferdinand VII. of Spain in 1829, and at his death, in 1833, was made regent for her daughter, Isabella. Her claims and those of her daughter were supported by the Spanish liberals, but Don Carlos led a rebellion in hope of securing the throne, and in 1836 she was forced by a conspiracy to grant a constitution to Spain. Four years later she was compelled to flee to France for safety, but returned in 1843, though the patriotic party exiled her in 1854. In 1864 she again returned to Spain, but disturbances arising on account of her presence caused her to be exiled permanently in 1868. Early in the regency period she formed a marriage contract with Fernando Munoz (died Sept. 12, 1873), a member of the royal bodyguard, and by him had ten children. The period of regency was disturbed principally because of the Carlists, yet she showed little interest in the common weal, her main ambition being to retain her own power.

MARIA THERESA (ma-rī'a te-ree'sä), empress of Germany and Austria, and queen of Hungary and Bohemia, born in Vienna, Austria, May 13, 1717; died Nov. 29, 1780. She was the daughter of Charles VI., and in 1736 married Francis Stephen, grand duke of Tuscany, who shared with her in the government after her accession to the throne. The powers of Europe agreeing to the pragmatic sanction, the right of succession to the throne was extended to females of the royal line. At the death of her father, on Oct. 21, 1740, she ascended the throne, but contestants at once put forth conflicting claims. The finances of the government having been reduced by war, the people became discontented, and a number of the German princes claimed large portions of her dominion. Soon after Frederick the Great led his armies into Sicily; the Bavarians invaded Bohemia; Naples and Spain put forth claims to the Austrian territory of Italy, and the young queen fled for safety to Presburg, where she threw herself upon the sympathy and patriotism of her Hungarian subjects. The Hungarians responded to her appeal with alacrity, expelled the Bavarians and French, and thus began the Seven Years' War for title to the Austrian throne. Several of the contestants quarreled among themselves, and, when the treaty of Aix-la-Chapelle in 1748 terminated the war, she lost only Glatz, Silesia, Picenza, Parma, and Guastalla, but gained the advantage of having her husband elected emperor.

MARIA THERESA.

However, the reins of government remained in the hands of Maria Theresa, and she began at once to encourage financial reforms, and to develop commerce, agriculture, and manufactures. With the increased revenues she strengthened the army and national defenses, but gradually lessened taxation, thereby attaining the confidence of her subjects. With a desire to regain Silesia, she adopted a policy that brought on the Seven Years' War with Frederick the Great of Prussia, during which her claims to that territory were lessened greatly and the country once more became exhausted financially. Upon the cessation of hostilities, she again put forth remarkable ability in

bettering internal conditions, founded schools and universities, reformed the criminal practice, and improved the condition of the peasants. In 1764 her son Joseph became king of the Romans, and at the death of her husband, in 1765, she gave a part of the official duties of her own dominion over to him. In 1772, when Prussia and Russia entered upon the partition of Poland, she joined them and received as her share Lodomeria and Galicia. In 1777 she compelled Turkey to cede Bukowina, and in 1779 acquired Innthal by the treaty of Teschen. Though a devout Catholic, she enforced various religious reforms, among them those suppressing the inquisition at Milan and certain practices of the Jesuits, and forbade entering monasteries before the age of twenty-five years. Three sons and six daughters survived her, among them Marie Antoinette and Joseph II., the latter succeeding her to the throne.

MARIAZELL, a village in Austria, situated in the grand duchy of Styria, and famous on account of an image of the Virgin Mary. The image was presented to the place in 1157, and in 1644 placed in a magnificent church, where it is visited annually by thousands of pilgrims.

MARIE ANTOINETTE (mä-rē'ŏn-twänĕt'), **Josephe Jeanne**, queen of France, youngest daughter of Francis I. and Maria Theresa of Austria, born in Vienna, Nov. 2, 1755; guillotined in Paris, France, Oct. 16, 1793. In 1770 she was betrothed to the dauphin of France, afterward Louis XVI., and the marriage took place in May of the same year at Versailles, where she was received with distinction by her husband and his father, Louis XV. The frankness and pleasantry of the young dignitary did not meet with approval by the stiffness and rigidity of French etiquette, and she was accordingly neglected by her husband. It was the policy of Austria to strengthen the Austrian alliance by this marriage. However, many of the French people thought they discovered a dislike for the young queen when she ascended to that position in 1774, and enemies at once circulated reports of intrigues and personal recklessness against her, none of which were ever proven. Her faults were largely in that her coming in contact with the gaiety of Paris at an early age had imbued her with a desire for fine dress, pleasure, and banquets, and had so bent her disposition that she could not appreciate the misery and deplorable condition of the common people of France. She came to be called "The Austrian," and all the wrongs and extravagances of the government officials were charged to her. Her husband was negligent and careless in molding public policy, while she was courageous and persistent, but misunderstood the public will. In 1779 the states-general met, a body to which she showed opposition, and by it she was declared the cause of financial derangements.

MARIE ANTOINETTE.

In October of the same year Marie Antoinette was given a brilliant reception at a ball in Versailles, on account of which an insurrection of women arose and made an attack on Versailles, but when all others lost heart she appeared in full sight upon the balcony with a display of bravery and self-possession which won her momentary respect. The revolutionists looked upon her as the head of armed opposition to their cause, but her husband could not be induced to take advantage of bringing the military forces to his support, neither did he have the moral strength to bring about reforms by quiet means. Her attitude was that of an extreme royalist, disliking such liberal noblemen as Mirabeau and Lafayette, and when the former died, in 1791, all assurance of maintaining the monarchy became lost. When this became apparent, she advised rapid flight, but her husband could not be induced immediately to seek safety in that way, and, when the royal family finally attempted flight in June, 1791, they were intercepted at Varennes and returned. Not long after the Tuileries was stormed, and on August 10, 1792, the legislative assembly announced the deposition of her husband. The convention condemned the king to be executed, but she remained by him with a spirit of heroism, enduring the many severe trials like a martyr. In October charges were brought against her, alleging that she had given aid to foreign enemies of France, dissipated the finance, and encouraged domestic strife, but she defended herself before the revolutionary tribunal with marked firmness, and, when the sentence of death was placed upon her, she displayed the calmness of a hero. Her execution, which she bore in a dignified manner, quickly followed the sentence, but her twenty-three years of residence in France had made her aged and gray-haired, a woman who showed the heavy burdens placed upon her, though only about thirty-eight years of age. Her son, Louis XVII., died shortly after at the age of eight years. However, her daughter was permitted to leave France, and subsequently married the duke of Angouleme.

MARIETTA (mā-rĭ-ĕt'ą), a city of Ohio, in Washington county, at the confluence of the Muskingum and Ohio rivers. The settlement founded there in 1788 was one of the first in the Northwest Territory. It has extensive railroad connections, a fine street car system, good public schools, and is the seat of

Marietta College, an institution founded in 1835. The surrounding country is agricultural, and contains deposits of gas, oil, and coal. Among its manufactures are farming machinery, flour, hardware, cigars, furniture, leather, carriages, and oil. Marietta College has extended courses of study, 350 students, a library of about 60,000 volumes, and is one of the many prosperous educational centers of Ohio. The city has a growing trade in produce and merchandise. Population, 1900, 13,348.

MARIGOLD (măr'ĭ-gold), the name of various plants of the aster family, having flowers prized for their beauty and deep yellow color. The common species of garden and pot marigolds have sessile leaves with double orange-colored flowers. They are native to southern Europe, and attain a height of from one to two feet. The bur-marigold is native to the United States, where it thrives in wet places, and is allied to the water-marigold, also a native of the United States. The fig-marigold is native to Africa, and the corn-marigold to Britain; the latter is classed as a chrysanthemum. Many of the species have been improved by cultivation, are widely naturalized, and are used for flavoring edibles and in coloring butter and cheese. They are raised from the seeds, being transplanted when three or four inches high.

MARINETTE (măr-ĭ-nĕt'), a city in Wisconsin, county seat of Marinette county, located on Green Bay, at the mouth of the Menominee River. It has an excellent harbor, important lines of steamboats and railways, and an extensive electric street car system. The general facilities embrace city waterworks, pavements, electric lights, good schools, and a public library. Among the manufactures are lumber products, ironware, paper, machinery, and flour. There is a fine county courthouse and other county and city buildings of note. Population, 1900, 16,195.

MARIO (mä're-o), **Guiseppe**, eminent singer, born in Cagliari, Italy, Oct. 18, 1810; died in Rome, Dec. 11, 1883. He was the son of General di Candia, served in the army several years, and later studied music in Paris. Shortly after he was chosen first tenor at the opera, where he became noted for his marked ability, and subsequently appeared at St. Petersburg. In 1854 he visited the United States, making a second visit in 1872. At London his musical efforts were exceedingly popular, netting him large sums, but his fortune was spent in speculations. He married the celebrated singer, Giulia Grisi (q. v.), and was the father of six daughters.

MARION (mā'rẹ-un), a city in Indiana, county seat of Grant county, on the Mississinewa River, sixty-five miles northeast of Indianapolis. The surrounding country is fertile and contains deposits of natural gas. Besides other fine buildings, it has a modern courthouse and city hall. Convenient railroad facilities make Marion a commercial center. Its manufactories produce machinery, clothing, glass, bicycles, furniture, boilers, flour, spirituous liquors, and cigars. The municipal facilities include street railways, public lighting, waterworks, and pavements. There are fine churches and schools, and a number of civic and educational societies. It is also the seat of a soldiers' home. Population, 1900, 17,337.

MARION, a city in Ohio, county seat of Marion county, about forty-three miles north of Columbus. It has important railroad connections, street railways, public lighting, pavements, numerous churches, and good schools. In its vicinity are extensive deposits of limestone, which are quarried for building purposes and the manufacture of lime. It has a large trade in merchandise and produce. The industries of the city produce carriages, flour, steam machinery, ironware, bicycles, engines, threshers, and utensils. It has a fine courthouse and other public buildings. Population, 1900, 11,862.

MARION, Francis, Revolutionary general, born in Winyaw, South Carolina, in 1732; died Feb. 28, 1795. He descended from a Huguenot family, received a common school education, and served against the Cherokee Indians in 1759-61. Subsequently he was a member of the provincial congress, and at the beginning of the Revolution joined the colonists, serving as lieutenant-colonel at Fort Moultrie in 1776, and in the unsuccessful attack on Savannah in 1779. In 1780 he organized the celebrated Marion's Brigade, with which he supported General Gates, and subsequently operated in the vicinity of the Pedee River and other parts of the Carolinas. From his camp at Snow's Island he made many successful surprises upon the British, defeating them in various skirmishes, and became known as the "Swamp Fox." It is said that a British officer who visited his camp found his fare to consist of roasted sweet potatoes, served on a bark of elm, and a drink made by mixing water and vinegar, and that he afterward gave up his commission, declaring his inability to battle against a patriotism so devoted as that of Marion and his men. Marion's Brigade aided in the capture of Fort Watson and Eutaw Springs, and took Georgetown. After the war he engaged in farming, but also served as a state senator of South Carolina, aiding to devise a state constitution and in furthering progressive legislation. He was one of the purest and bravest of American patriots.

MARIUS (mā'rĭ-us), **Caius**, Roman general, born at Cereatæ, Italy, in 157 B. C.; died in 86 B. C. He descended from obscure parents, joined the army under the younger Scipio Africanus, and won distinction at Numantia in 134 B. C. He became a plebeian tribune in 119 B. C., in which office his

popularity among the common people became universal on account of opposing the nobles in their attempts to oppress popular rights. Five years later he was made proprætor of Spain, where he dispersed the bands of marauders that had infested the peninsula, and shortly after married Julia, the aunt of Julius Cæsar, thus increasing his influence with those in command. Subsequenty he took a prominent part in the Jugurthine war of Africa, was made consul at Rome, and a year later became proconsul to end the war against Jugurtha. A jealousy had sprung up between him and Sulla, but it fell to the lot of the latter to end the Jugurthine war in 106 B. C., and the contentions ensuing from this event occasioned a disastrous civil war.

Marius was compelled to flee from Rome and found safety in Africa, but movements in his favor brought about his recall in 104 B. C., when he was made consul. Immediately he marched with a vast army against the invading Teuton and Cimbri legions. After a series of battles covering two years, the Teuton forces were defeated in a memorable battle near the site of the present Aix in Provence, France, where fully 150,000 lost their lives. His popularity in Rome was so great that he served six different times as consul, was lauded as the Savior of the State, and mentioned at banquets in connection with the gods. In the year 88 B. C. Sulla was appointed to command in the war in the East against Mithridates, on account of which the old jealousy again sprang forth between the two warriors, and Marius was compelled to flee for safety to the ruins of Carthage, which he reached by many remarkable escapes after landing in Africa. Cinna now led a movement in his favor at Rome, and Marius returned to join him in capturing the city. This was not a difficult task, as the people were anxious to revenge the wrongs perpetrated upon them by the aristocracy. Marius and Cinna accordingly engaged 4,000 slaves to massacre the principal opponents, which was accomplished in about five days, and the two declared themselves consuls of the Roman possessions. Marius did not long enjoy his newly conquered opportunities, as he died seventeen days after the proclamation.

MARJORAM (mär'jō-rəm), a class of plants of the genus origanum. They have nearly entire leaves, dense oblong spikes of flowers, and colored bracts. The two principal species are the sweet marjoram and the pot marjoram; both are cultivated for seasoning in cookery. The common marjoram is native to western Europe, and is perennial. It has small acute leaves, reddish flowers, and has been naturalized in the United States. The blossoms are used as a seasoning, and the oil of marjoram, which is also called oil of thyme, is distilled from the various species.

MARK, the evangelist whose name is prefixed to the second gospel, and who is thought to be the same as mentioned in Acts xii. as the "John whose surname was Mark." His mother was named Mary and lived in Jerusalem, and her house is mentioned as a resort of Christians. His conversion is attributed to Peter, and he is thought to be the young man nearly captured on the evening Christ was betrayed. Mark accompanied Paul and Barnabas on their first mission as far as Perga in Pamphylia, but there left them and returned to Jerusalem. It is thought that Barnabas, his relative, looked upon him as a trustworthy follower, but that Paul thought him fickle, on account of which the two separated, Barnabas taking Mark with him on a mission. Later Paul became a confidant of Mark, attended him during his final imprisonment, and mentions him favorably in 2 Timothy, but nothing certain is known of the closing years of his life. The gospel that bears his name is attributed to the year 70 A. D., and it is thought that it was the first of the gospels to be published. It is quite clear that the writer was well acquainted with Judæa, and that he designed the gospel that bears his name especially for the Gentiles, since it contains no statements likely to give offense to them. The style is more precise and graphic than that of the other gospels; the miracles are emphasized more than the discourses of Jesus, and the language is rather like that of St. Matthew than that of St. Luke. It is thought that the gospel was written either at Rome or Alexandria from the recollection that Peter had of his associations with Jesus, but the last twelve verses are of doubtful authenticity.

MARK ANTONY. See **Antonius, Marcus.**

MARKHAM (märk'ăm), **Clements Robert**, naval officer and author, born in Stillingfleet, England, July 30, 1830. He studied at Westminster, entered the navy in 1844, but left the service in 1851 to become a clerk of the board of control. In 1868 he secured charge of the geographical department in India, and subsequently accompanied the Arctic expedition in search of Sir John Franklin. Afterward he explored the forests of the Eastern Andes in South America, introduced the cinchona plant into India, and served as geographer in Abyssinia. His publications include "Travels in Peru and India;" "War Between Peru and Chile;" "Franklin's Footsteps," and "History of Peru." He was also editor of the "Geographical Magazine" in 1872-78.

MARL, a deposit of earthy matter, consisting principally of calcium carbonate, sand, and clay in various proportions. The more prominent ingredients characterize its appearance and consistency, the carbonate of lime usually varying from five to twenty per cent. It is used as a fertilizer, its utility for this purpose depending largely upon the

presence of calcareous and argillaceous substances. In England, France, Germany, and other European countries marl has been used for fertilizing for many centuries, though in some countries slacked lime is employed as a substitute for the mineral marl.

MARLBORO (märl'bŭr-rō), a city of Massachusetts, in Middlesex county, about thirty miles west of Boston. It has extensive manufactures of shoes, ironware, machinery, vehicles, cigars, and fabrics. There are excellent railway connections, electric lights and street railways, pavements, fine public schools, numerous churches, and a public library of 15,000 volumes. The surrounding country is agricultural and dairying, and near it is Williams Lake, a sheet of water covering about 160 acres. It has a number of fine buildings and a large trade in merchandise. Population, 1900, 13,609.

MARLBOROUGH (mawl'b'ro), **John Churchill, Duke of**, general and statesman, born at Ashe, in Devonshire, England, June 24, 1650; died June 16, 1722. He was the second son of Sir Winston Churchill, who lost his fortune in befriending Charles I., and consequently his education was limited. The duke of York made him an ensign of guards in 1666, and subsequently he attained to the rank of captain in a regiment, with which he supported the French in the Netherlands. The French commander, General Turenne, praised him for distinction in the siege of Maestricht, on account of which he was made colonel. In 1678 he married Sarah Jennings, a lady of remarkable talents, who was instrumental in furthering the interests of Marlborough and advancing his prosperity. James II. made him a baron and general. The Monmouth rebellion was suppressed by him, but at first he supported secretly the prince of Orange, and subsequently deserted James entirely, receiving for his betrayal the earlship of Marlborough from the prince of Orange, who became William III. From 1689 to 1691 Marlborough displayed much ability in the Netherlands against France, but in the latter year he lost favor with William, was deprived of his offices and cast into the Tower on a charge of maintaining treasonable relations with the exiled king, but his release was soon secured, though he was deprived of public office for five years.

When Queen Anne succeeded William to the throne, in 1702, Marlborough was virtually regent. He succeeded in expelling the French forces from Spanish Guelders, Liege, and other cities, for which the queen made him a duke. In 1703 he campaigned successfully in the Lowlands, supported the emperor of Germany in 1704, and defeated the French and Bavarians in the decisive battle at Blenheim. His successes brought him an estate at Woodstock; the Blenheim palace was founded for him, and in 1705 he became a prince of the empire. In the battle of Ramilies, in 1706, he completely humbled Louis XIV. of France, by which the French forces were compelled to evacuate all of Spanish Flanders, and their attempt to regain that territory in 1708 was entirely frustrated at Oudenarde on July 11, in which Marlborough was supported by Prince Eugene. The battle of Malplaquet, in 1709, terminated in the defeat of Marshal Villars and the capture of Mons, but the contest was a fearful slaughter, the allied army losing fully 20,000 men, while the French lost less than one-half that number. His last campaign was made in 1710, in which he took additional towns from the French, but during his absence a hostile ministry was elected in England and the queen ended the intolerable tyranny exercised over her by the duchess of Marlborough. Accordingly Marlborough was accused of embezzling funds for private purposes, and in 1712 was deprived of all his offices. When George I. succeeded to the throne, he reinstated Marlborough in his military positions. A stroke of apoplexy affected him in 1716, on account of which his speech became slightly impaired, but he still filled his place in parliament. His wife, Sarah Jennings, was born on May 29, 1660, and died on Oct. 29, 1744. The family left a large fortune, which, together with a title, was inherited by the descendants of one of their daughters.

MARLOWE (mär'lo), **Christopher**, dramatist, born in Canterbury, England, Feb. 26, 1564; died June 16, 1593. He was the son of a shoemaker, studied at King's School, Canterbury, and at Cambridge, receiving a bachelor's degree at the latter in 1583. In 1587 Cambridge granted him a master's degree, and about that time he settled in London to write for the stage. It is thought that his first productions were presented in public in 1587. Many of them were rude and bombastic, but they were the first tragedies worthy of that name written in the English language, and his subsequent writings entitle him to the reputation of having been the greatest English dramatist before the time of Shakespeare. Many of his later productions show splendid imaginative force, delicate finish, and studious application. His life was reckless, his death resulting from a wound administered by a boisterous rival, Francis Archer, while engaged in a tavern brawl. Among the best of his productions are "Tamburlaine the Great;" "Edward II.;" "Tragical History of Dr. Faustus," and "Jew of Malta." He also translated the "Rape of Helen;" some of Ovid's "Elegies," and left a beautiful poem entitled "Hero and Leander" in an unfinished condition.

MARMONT (mar-mŏn), **Auguste Frederic Louis Viesse de**, marshal of France and duke of Ragusa, born in Chatillion-sur-Seine, France, July 20, 1774; died in Venice, Italy, Feb. 28, 1852. In 1789 he entered the army, attained to the rank of brigadier-

general, and returned with Napoleon from Egypt. He supported Napoleon in the revolution and opposed the Russians in the Ragusan territory, for which he was made duke of Ragusa. In 1809 he was present at the battle of Wagram, gained the battle of Znaim, and was made field-marshal. Shortly after he became governor of the Ilyrian provinces, and in 1811 secured principal command in Portugal, but a severe wound at Salamanca required him to return to France. He commanded at the battles of Lützen, Bautzen, and Dresden in 1813, and in 1814 maintained a spirited contest for Napoleon, but was forced to conclude a truce with Barclay de Polly, after which Napoleon abdicated. When Napoleon returned from Elba, he was compelled to flee for safety, but after the restoration Louis XVIII. made him a peer. The revolution of 1830 compelled him to accompany Charles X. in exile, and he resided principally in Vienna. In 1839 he published an account of his travels with Charles X., and later wrote a treatise on military affairs.

MARMORA (mär'mo-ra), **Sea of**, a sea lying between Europe and Asiatic Turkey, and known anciently as Propontis. It is connected with the Black Sea by the Bosporus, and with the Ægean Sea by the Dardanelles. Its length is 176 miles, breadth about fifty miles, and area 4,500 square miles. The coast lines are indented by a number of gulfs containing excellent harbors, and in the southern portion are several islands, of which Marmora is the largest, and is famous for quarries of alabaster and marble. Its seaport cities and Constantinople give it commercial importance.

MARMOSET (mär'mŏ-zĕt), a class of small monkeys of South America. They have a squirrel-like appearance. The long tail and body are covered with soft, woolly hairs. In some species the head is tufted. They subsist on insects, fruits, birds, and birds' eggs. The striated marmoset is one of the best known. Its body is eight inches long, tail ten inches, and the general color deep gray. The silky marmoset has long silken hairs.

MARMOT (mär'mŏt), a class of rodent quadrupeds allied to the squirrel, and native to North America and Eurasia. The best known species of North America are the prairie marmot or prairie dog, which occurs in large families on the western plains; and the woodchuck, found abundantly in the middle states. The Alpine marmot is native to the mountains of Europe. Its body is eighteen inches long, tail about three inches, and the color a dark gray. Allied species are found more or less widely distributed in different parts of Asia. Marmots live in large societies in extensive burrows, feed on roots, leaves, and grasses, are about as heavy as a common rabbit, but have very short legs and a bulky body. In the winter time they live in a state of torpidity, but in summer are very active, barking at the approach of danger, which is usually signaled by a monitor who keeps constant watch.

ALPINE MARMOT.

MARNE (märn), a river in France, rises in the Côte d'Or Mountains, and after a course of 275 miles joins the Seine near Paris. It is navigable for 210 miles. Among the towns on its banks are Chalons, Joinville, Langres, and Epernay.

MARNIX (mär-neeks'), **Philip van**, patriot and author, born in Brussels, Belgium, in 1538; died Dec. 15, 1598. He descended from a Dutch family of reputation, was an active supporter of the Reformation, and aided William of Orange in securing the throne of England. His defense of the Netherlands against the Spaniards made him popular with his people, and in 1583 he became burgomaster of Antwerp, which he defended against the Spanish army for more than a year, but was finally compelled to surrender. His writings consist largely of satires and poems, and he was the author of the Dutch hymn of liberty, entitled "Wilhelmus."

MARONITES (măr'ō-nīts), a sect of Christians who constitute a large class in Syria, and so named from a monk called Maron. The sect dates from the 5th century and numbers about 250,000. They acknowledge the pope of Rome as their head, but have the privilege of using the Syriac language in their service, and celibacy is not enforced upon the priests. Gregory XIII. founded the Maronite College for them in 1584, at which their priests are educated.

MAROONS (mâ-rōōns'), a name applied in Guiana and Jamaica to Negroes who have escaped from slavery, and also to their descendants. When Britain conquered Jamaica, in 1655, many slaves escaped to the mountains, where they constituted a formidable body until 1795, when they were subdued and removed to Nova Scotia, and later to Sierra Leone. In Guiana the Maroons still number fully 4,000. They are organized into independent communities, and support themselves by hunting, fishing, and pastoral pursuits.

MAROS (mŏr-ŏsh'), a river of eastern Hungary, having its source in the eastern

Carpathians, and after a course of 400 miles joins the Thiess near Szegedin. It is navigable for a distance of 228 miles, as far as Ujvar, and is an important commercial route. It receives the discharge from the Kokel River in Transylvania. On its banks are the cities of Vasarhely, Arad, and Menes.

MAROT (mä-rō), **Clement**, eminent poet, born in Cahors, France, in 1495; died in Turin, Italy, in 1544. He was educated at Paris, studied law, and afterward became associated with Francis I. as a poet and writer. In 1524 he accompanied that sovereign on his campaign into Italy, was wounded and taken prisoner at the battle of Pavia, and returned to Paris in 1525. His literary productions are of a very high character from the standpoint of style, composition, and thought, and their influence upon French literature has been considerable. He translated the Psalms. His chief writing is a version of "Roman de la Rose."

MARQUE (märk). See **Letters of Marque and Reprisal**.

MARQUESAS (mär-kā'säs), a group of Polynesian islands, located in the South Pacific Ocean, and discovered in 1596 by Mendana de Neyra, a Spanish navigator. They include an area of 495 square miles, have a population of 10,500, and are subject to the French government. The productions embrace tropical fruits, cattle, swine, and various manufactures. The inhabitants are a class of brown Polynesians. They tattoo themselves, are of strong physique, and have considerable development in industrial arts.

MARQUETTE (mär-kĕt'), a city in Michigan, county seat of Marquette county, located in the Upper Peninsula, on Lake Superior. It has an excellent harbor, is well connected by railways, and enjoys a large commercial trade. The manufactures include flour, powder, ironware, machinery. furniture, and lumber products. Among the chief buildings are numerous churches and a fine courthouse. There are modern municipal facilities, an orphan asylum, excellent public schools, and a Roman Catholic cathedral. In its vicinity are quarries of brown sandstone, iron mines, and large regions utilized in agriculture. The city has a fine library, and is noted as a favorite resort for tourists and invalids. Population, 1904, 10,665.

MARQUETTE, Jacques, celebrated explorer, born in Laon, France, in 1637; died May 18, 1675. He entered the Jesuit order, and in 1666 was sent to Canada as a missionary, where he made a study of Indian languages, and founded a mission at Sault Ste. Marie. Subsequently he began preaching among the Ottawa and Huron Indians, and accompanied them to Mackinaw, where he founded a second mission. In 1673 the governor of Canada sent him to explore the Mississippi River. Accordingly he descended the Illinois River by canoes to the Mississippi; descended that river to the mouth of the Arkansas, and thence returned again by practically the same route, reaching Mackinaw after a journey of 2,500 miles. In 1674 he made a second trip to Illinois, when he built a log hut on the site of Chicago, and thence proceeded to the settlements of the Kaskaskia Indians, where, in 1675, he began building a mission near the present site of Kaskaskia, Illinois. While at that place his health began to fail, and, feeling certain that he could not long survive, decided to return to Mackinaw, but his death occurred while near Lake Michigan. Marquette was accompanied by Joliet in his first voyage down the Illinois River, in 1673, and together with that explorer left a number of valuable notes regarding the early aspect of the Mississippi valley. He was among the first to publish that the Mississippi River flows into the Gulf of Mexico.

MARRIAGE, a mutual and voluntary contract between a man and a woman, properly based on mutual regard and affection, and suitably ratified, to live together as husband and wife until separated by death. All the civilized countries regard marriage as an essential institution and maintain laws for its proper protection. The main design of marriage is to constitute the family, and for the preservation of moral and social purity, the continuance of the race, and the training of the young for the duties of life. Monogamy is a term used to designate the marriage institution under which an individual may have but one person in marriage, while polygamy implies a plurality in wives, and polyandry a plurality of husbands. In ancient times both polygamy and polyandry existed more or less among the people of the most intelligent countries, and both are still practiced to some extent in various countries, particularly in Thibet and other regions of Eurasia. Several of the Christian churches regard marriage among the sacraments, holding that it can be set aside only by death, while the law generally holds it to be a civil contract that may be terminated for good and sufficient cause under the divorce laws. In practically all of the states marriage and divorce laws are maintained, but all of them are modeled more or less after the common laws of the leading countries of Europe.

In most of the states a marriage contract cannot be made by males under twenty-one and females under eighteen unless consent is given by the parents or guardians. License must be obtained from a proper officer, and the marriage solemnized by a clergyman or a civil officer competent to perform that act, and in some states a definite number of witnesses must be present at the time. The marriage contract also differs from a civil contract in that it cannot be set aside by mutual consent, but only in a court having competent jurisdiction of such cases. The grounds for divorce include desertion, impo-

tency at the time of marriage, the commission of felonies, and others, but in this the laws of the several states do not exactly coincide. A movement has been on foot for some time looking toward to uniform marriage and divorce laws in all the states, the consummation of which no doubt, would be in the interest of bettering family relations. In 1899 the general assembly of North Dakota enacted a law whereby it was made necessary for parties wishing to enter a marriage contract to appear before a commission of three physicians, such a commission being established in each county, and in their presence have it determined whether the parties wishing to marry are fitted to enter into such relations. It is certain that such a measure is sound from a sanitary point of view, since it guards against the procreation of defective or degenerate offspring. A like control of marriage contracts has been advocated in various states, and in many of the countries of Europe. See **Divorce**.

MARRYAT (măr'ri-at), **Frederick**, sailor and novelist, born in Westminster, England, July 10, 1792; died at Langham, Aug. 9, 1848. He joined the navy as midshipman in 1806, served on the Mediterranean, and in 1815 attained to the rank of commander. Shortly after he served in India, where he rose to the rank of captain, and after 1830 devoted his time to the study of literature and contributions to magazines. Many of his novels deal with sea life. They are especially interesting to the young, and have had a very wide reading. Among the most widely known are "Frank Midway;" "Midshipman Easy;" "Japhet in Search of a Father;" "Phantom Ship," and "Jacob Faithful."

MARS.

MARS, in Roman mythology, the god of war, corresponding to the Greek Ares. He was the son of Juno, and as father of Romulus was the traditional founder of the Roman race. In common with Jupiter he was designated father. Besides presiding over war, he was regarded the protecting deity who watched over the welfare of the state and presided over agriculture. There were twelve priests of Mars, called Salii, who were always chosen from the noblest families in Rome. Before departing for the battlefield the Romans invoked the assistance and protection of the god of war, and any reverses of fortune were invariably ascribed to his anger. There were many temples dedicated to him in Rome, the most sacred being one on the Campus Martius, one on the Appian Way, and one built by Augustus in the Forum and called Mars the Avenger. In statuary he is represented with the helmet, shield, and spear, and the animals consecrated to him included the wolf, horse, vulture, and woodpecker. Many of the military exercises and the month of March were named in his honor, while his festivals were held in the month of March and on the Ides of October. Women did not participate in the worship of Mars.

MARS, a superior planet, the one most like the earth, and with which we first come in contact in passing from the orbit of the earth, being located in space between the earth on one side and a vast cluster of asteroids on the other. It appears to the naked eye as a red star with a steady light, by which it is distinguished from the fixed stars. The mean distance from the sun is placed at 139,875,000 miles, and at perihelion it is about 26,000,000 miles nearer to that luminary than in aphelion. Its average velocity is about fifteen miles per second, the day about forty minutes longer than ours, and the year is equal to 687 terrestrial days. Its distance from the earth varies from 33,000,000 to 243,000,000 miles. Mars has a diameter of 4,300 miles, a volume one-fourth that of the earth, and a density of only one-half, thus the mass is about one-eighth of the terrestrial mass. Its orbit is inclined to the ecliptic at an angle of 1° 51′ 5″; the heat received from the sun is less than one-half that of the earth, and its axis is inclined about 28.7°, therefore its seasons and zones are quite similar to ours. Its atmosphere is like ours and has clouds, while the telescope reveals reddish spots that are thought to be continents, and greenish tints which are considered bodies of water. The proportion of land to water is directly reversed from that of the earth, fully three-fourths being land. White portions apparently surrounding the poles indicate that there are snow-zones. This is further verified by the snow-zones apparently melting during the summer season, and increasing in size on the approach of winter. No mountains have been discovered, but Professor Hall of the Naval Observatory, Washington, discovered two small satellites

in 1877. The one nearest the planet is thought to be 5,900 miles from it, and makes a complete revolution in seven hours and thirty-eight minutes; while the one farthest away is 14,600 miles, and makes a revolution in thirty hours and fifteen minutes. See **Tesla, Nikola.**

MARSEILLAISE (mär-sâ-yăz), the celebrated war song of the French Republic, which was written by Rouget de Lisle (1716-1836), an officer of artillery, of Strasburg, Germany, in 1792. The name given it by the author is "Song of the Army of the Rhine," but the name by which it is now known was applied to it from a party of the Marseillaise Club that occurred in Paris on the invitation of Madame Roland. The revolutionists adopted it in all the centers of population, but its use was forbidden during the empire. Soon after the beginning of the Franco-German War the republicans again made it popular.

MARSEILLES (mär-sālz'), an important seaport and commercial city of France, situated on the Mediterranean Sea, and connected by several important railways. It is the capital of the department of Bouches-du-Rhone, is the most important foreign trade city of France, and has an excellent natural harbor. A Greek colony from Asia Minor settled at its present site about the year 600 B. C., and it was first known as Massalia. A high state of civilization flourished at Massalia under the Grecians nearly 600 years. It was taken by Cæsar in 49 B. C., and with the decline of Rome became subject to the attacks of Gothic invaders. The Saracens conquered it in 735, and in 1575 Henry III. of France made it a part of his dominion. It has been noted from antiquity for its inclination toward republicanism, and existed for some time as an independent city. In 1871 it was foremost in supporting the new republic.

The city now contains many excellent public institutions, among them government buildings, fine schools, several colleges, a university, and a public library of 85,000 volumes. Its botanical and zoölogical gardens are among the finest in France, as are also its museum and system of elementary education. There are manufactures of machinery, cotton and woolen goods, clothing, sugar, iron and brass ware, glass, oils, soap, chemical products, leather, silk, spirituous liquors, flour, and canned goods. Near the city are many valuable fisheries. The trade has been growing constantly in importance since the construction of the Suez Canal, and the vast colonial possessions established by France in North Africa. Among the municipal facilities are public lighting, excellent boulevards, electric street railways, sanitary sewerage, and city waterworks. Population, 495,640.

MARSH, George Perkins, diplomat and educator, born in Woodstock, Vermont, March 15, 1801; died June 24, 1882. In 1820 he graduated at Dartmouth College, began the practice of law at Burlington, Vermont, and in 1835 became a member of the state legislature. He served as a member of congress in 1842-48, being elected as a whig, and in the latter year became minister to Turkey, but was sent on a special mission to Greece in 1852. In 1861 he was made minister to Italy, in which position he served until his death. Marsh was a lecturer and philologist of a splendid reputation, having addressed large audiences in European and American cities, and lectured on philology at Lowell Institute and Columbia College. He wrote "Origin and History of the English" and "Lectures on the English Language."

MARSH, Othniel Charles, naturalist, born in Lockport, New York, Oct. 29, 1831; died in New Haven, Conn., March 18, 1899. He studied at Phillips College, in Andover, graduated from Yale in 1860, and subsequently took advanced work in the German universities of Berlin, Heidelberg, and Breslau. He became professor of palæontology at Yale in 1866, a position he retained to the time of his death. For the purpose of making special study of extinct vertebrate animals, he made several exploring expeditions to the Rocky Mountain region of the United States, where he discovered about 1,000 new species of vertebrates, crossing the Rocky Mountains twenty-seven times in his researches. Some of his discoveries are of great value, and have been designated as the product of the most studious scientist of the last century. Besides writing many scientific articles, he delivered numerous addresses, and published several volumes of reports on palæontology. In 1898 he turned his entire scientific collections over to the Peabody Museum at Yale. Several American and foreign scientific societies recognized his ability by according him distinguished honors.

MARSHALL, county seat of Harrison county, Texas, about forty-two miles east of Dallas. It is surrounded by a fertile agricultural country, which also contains mineral springs, deposits of iron, and valuable forests. There are excellent railway connections, important municipal facilities, and a fine system of public schools. The manufactures embrace machinery, furniture, cotton goods, oils, ice, and lumber products. Among its educational institutions are the Baptist Bishops' College, Methodist Wiley University, and an institute for women. Population, 1900, 7,855.

MARSHALL, a city in Missouri, county seat of Saline county about seventy-five miles east of Kansas City. It is situated on several railroads, and is surrounded by an agricultural country, which also has deposits of coal and building stone. Besides fine public schools, it is the seat of the Missouri Valley College and St. Xavier's Academy. Among the manufactures are carriages, earthenware, canned goods, salt, and ma-

chinery. Electric lights and waterworks are among the improvements. Population, 1900, 5,086.

MARSHALL, John, celebrated jurist, born in Germantown, Virginia, Sept. 24, 1755; died July 6, 1835. After completing an elementary education, he entered upon the study of law, but soon after joined the Revolutionary army, serving under his father, Colonel Marshall, from 1775 to 1779, taking part in the battles of Brandywine, Monmouth, and several others. After the close of the war, he began the practice of law, was elected to the Virginia general assembly, and in 1788 contended on the side of the federalists in the convention that adopted the constitution. In 1797 he accompanied Gerry and Pinckney as envoy to France, and was ordered from that country upon refusing a loan to Talleyrand. Returning to the United States in 1798, he served as congressman in 1799-1800, and as secretary of state in 1800-01, being made chief justice of the supreme court by President Adams in the latter year, a position he held until his death. Marshall rendered many opinions in defining and interpreting the constitution, presided over the Burr trial, and wrote "Life of Washington."

MARSHALLTOWN, a city in Iowa, county seat of Marshall county, on the Iowa River, fifty-two miles northeast of Des Moines. It is the focus of several important railroads, which furnish splendid transportation facilities. The city is surrounded by an excellent farming and dairying country, and has a large commercial trade. There are manufactures of machinery, glucose, soap, canned goods, and packed meats. It has an excellent high school, electric lights, and street railways, pavements, and a fine courthouse. There is a large trade in produce and merchandise. It is the seat of the Iowa Soldiers' Home, has a public library, and numerous church buildings. Population. 1900, 11,544.

MARSHFIELD, a city of Wisconsin, in Wood county, seventy-five miles east of Eau Claire. It has fine railroad facilities, and is surrounded by a rich farming and stock-raising country. The manufactures include lumber products, machinery, clothing, and earthenware. Good public schools, electric lights, and waterworks are among the improvements. It is the seat of St. Joseph's Hospital and a water-cure sanitarium. There is a growing trade in merchandise. Population, 1900, 5,240.

MARSH-MALLOW, a plant common to Eurasia, including several species, and found in marshes and meadows. The common marsh-mallow is a perennial plant, has a stem from two to three feet high, and bears a flesh-colored flower and a carrot-shaped root. The stem yields fiber, starchy substances, and sugars, though the last named are found principally in the roots. Different parts of the plant are used in the preparation of demulcent lozenges. Several species have been widely naturalized, among them the hollyhock, which is an allied plant.

MARSTON (mär'stǫn), **Westland**, dramatic poet, born in Boston, England, Jan. 30, 1820; died in London, Jan. 5, 1890. He published his first tragedy, entitled "Patrician's Daughter," in 1842, by which he became widely known, after its presentation at Drury Lane. In 1876 two volumes of his poetical works were published. His son, Philip Burke Marston, was born in London, Aug. 13, 1850; died there Feb. 14, 1887. He was blind from childhood. Hake's poem, "The Blind Boy," was dedicated to him, as was also Mrs. Craik's "Philip, My King." His first volume of poems was published in 1870, entitled "Song Tide," and five years later a second volume appeared, entitled "All in All," while in 1883 he published a third, entitled "Wind Voices." His productions contain many beautiful sentiments, are of fine poetical construction, and attracted the favorable notice of Swinburne, Browning, Dickens, and Rossetti.

MARSTON MOOR, a region of England, situated seven miles west of York, and celebrated for a battle fought there on July 2, 1644. It was a decisive contest between the royal army of Charles I. under command of Prince Rupert, and the parliamentary forces under Fairfax and Cromwell. The latter were victorious, and the result was to bring Cromwell into prominent notice. The royalists lost 4,000 killed and were compelled to flee.

MARSUPIALIA (mär-sū-pĭ-ā'lĭ-ȧ), a group of mammals that have a marsupium or pouch, and which include various species, some being vastly different in their organization from ordinary mammals, while others are quite similar. Some species are rodents, others carnivorous, some insectivorous, and several types herbivorous. They are different from other mammals more particularly because the young are brought forth of a small size and imperfect in condition, and immediately after birth are placed in the pouch or marsupium. The pouch contains mammæ or teats to which the young become attached, and are there nourished by milk food to maturity. Naturalists connect the marsupials to birds and reptiles through the monotremata, since this arrangement faintly approaches the oviparous characteristics. Most species of marsupials are native to Australia and the vast archipelago southeast of Asia, but the American ant-eater, opossum, and bandicoot belong to the group. The principal species are the kangaroos, kangaroo-rats, Tasmanian tigers, wombats, opossums, bandicoots, and the ant-eaters.

MARTEN (mär'tĕn), a class of carnivorous quadrupeds, characterized by a slender and elongated body, short legs, sharp claws, bushy tail, and body formed similarly to that of the weasel. Martens live largely among

trees, which they are able to climb with much facility. The North American group includes about ten species, among them the beech-marten, pine-marten, and sables, all

PINE MARTEN.

of which yield valuable fur. Most of these species and several others occur in the northern part of Eurasia, particularly in Siberia, where the sable-marten attains a large size, fully forty-five inches in length. Several of the smaller species yield a fine grade of fur used in ornamental trimming.

MARTHA'S VINEYARD, an island belonging to the state of Massachusetts, and forming the principal part of Dukes county. Other islands connected with it are Chappaquiddick and the Elizabeth Islands. Martha's Vineyard is twenty-one miles long, from two to seven miles wide, and contains several prosperous towns, a railway line, and is popular as a summer resort. Edgartown, in the eastern part of the island, is the county seat, and at the promontory of Gayhead is a lighthouse.

MARTIAL (mär'shĭ-al), **Marcus Valerius Martialis**, noted Roman writer of epigrams, born in Bilbilis, Spain, March 1, 43 A. D.; died in 104. He pursued study in his native town and in 66 went to Rome, where he resided till the year 100. At Rome he gained the patronage of Titus and Domitian by writing epigrams and poems characterized by much wit, and was awarded the rank of equestrian. His "Epigrammata," consisting of fourteen books, constitute the works from his pen that are still extant, and were widely read in Rome and the Roman provinces. The larger part of these were written at Rome, but several were completed in Gallia Togata, and others at Bilbilis. Martial displayed wonderful inventive facility. His works possess great literary value, particularly because they are the productions of an epigrammatist who did not draw his fund of inspiration from Grecian writers. In 100 he returned to Bilbilis, where he married a lady calley Marcella, and resided on her estate until his death.

MARTIAL LAW (mär'shal), a term pertaining to military operations, and embracing the exercise of arbitrary power by the military authorities of regions where ordinary administration has been rendered inoperative by civil disturbances. It differs from military law, in that the latter governs the soldiers of an army at all times, while martial law is applied more particularly to civilians when accompanying a military force on active service, and its administration rests with the officials in supreme authority. The conditions under which martial law may be exercised are set forth in the army regulations of the United States. In cases of riot or insurrection the governor of a state or territory, or the president of the United States, may declare martial law by proclamation, but it is limited to the region affected by the disturbances, which is said to be under martial law.

MARTIN. See **Swallow**.

MARTIN, the name of five popes of Rome, who reigned between 649 and 1431. Martin I. succeeded Theodore I. in 649; died Sept. 16, 655.—Martin II. became pope in 882; died in 884.—Martin III. was pope from 943 to 946.—Martin IV. succeeded Nicholas III. in 1281; died on March 25, 1285.—Martin V. succeeded John XIII. in 1417; died on Feb. 20, 1431. See **Pope**.

MARTIN, John, historical and landscape painter, born near Hexham, England, July 19, 1789; died Feb. 17, 1854. He first studied painting in Newcastle, but removed to London in 1806, where he married at the age of nineteen, and in 1812 made his first exhibit at the Royal Academy. The picture exhibited is entitled "Sadak in Search of the Waters of Oblivion," and brought him into favorable notice. His most famous works include "Expulsion from Paradise;" "Joshua Commanding the Sun to Stand Still;" "Fall of Nineveh;" "Deluge;" "Creation," and "Belshazzar's Feast." He was awarded a prize of $1,000 for the last named at the British Institution.

MARTIN, Saint, bishop of Tours, born in the Roman province of Pannonia about 316 A. D.; died about 400. He was the son of a military tribune, was educated at Pavia, entered the military service under Constantine, and later under Julian the Apostate. While serving in the army he embraced Christianity. On returning to his home he converted his mother and many of his friends to the Christian faith, and about 360 established a convent near Poitiers, France, where he passed much of his time in seclusion, but in 371 was made bishop of Tours. The Roman Catholic Church celebrates his birth on November 11. He is held in high esteem because of his firmness in professing orthodoxy, and because of great piety. The "Confession of Faith on the Holy Trinity" is the only literary work of Martin now extant.

MARTIN, William Alexander, American missionary, born in Livonia, Indiana, April 10, 1827. In 1846 he graduated at the Indiana State University, took a course in theology, and in 1849 became a missionary

to China under the Presbyterian Board. When concluding a treaty between the United States and China, in 1858, Martin served as interpreter for the minister, William B. Reed. He founded a mission in Pekin soon after, and in 1859 became president of the Pekin Tungwen College, where he also taught international law. The Chinese government sent him to the United States and Europe in 1880-81 to prepare a report on educational affairs, receiving the third rank of mandarin for his services. His publications embrace "Education, Philosophy and Letters of China;" "Religious Allegories;" "Evidences of Christianity;" "Chinese Legends and Other Poems," and a translation of Woolsey's "Study of International Law."

MARTINEAU (mär'tĭ-nō), **Harriet**, authoress, born in Norwich, England, June 12, 1802; died June 27, 1876. She was the daughter of a manufacturer, was reared in an intellectual and industrious home, and received a good literary training. Deafness began to affect her at an early age, and she was physically weak during most of her life. Her first writings appeared as contributions to the "Monthly Repository" in 1821, and soon after she reviewed for that periodical at the annual salary of $75. Her "Illustrations of Political Economy," which appeared in 1832, established a wide reputation for her, and this was followed shortly by "Illustrations of Taxation." These two publications went through many editions, and gave her ample returns for support and further activities. She visited America and the United States in 1834, on account of which she published "Society in America" and her "Retrospect of Western Travel." She also became a favorite contributor to the "Westminster Review." Much of her life was made unhappy by ill health, but she was a student of scrutinizing vigor, had a wide range of human sympathy, and was esteemed by her friends and readers with the highest regard. Many of her writings are still widely read, some of them taking a favorite place in home and public libraries. The principal works, besides those named above, include "Household Education;" "Forest and Game Law Tales;" "History of the Thirty Years' Peace;" "Life in the Sick Room;" "Essential Faith of the Universal Church;" "Hour and the Man;" "Feats of the Fiord;" "Biographical Sketches;" "Autobiography," and "Peasant and Prince." She also translated Comte's "Positive Philosophy."

MARTINIQUE (mär-tĭ-nēk'), an island of the Lesser Antilles, situated between the Caribbean Sea and the Atlantic Ocean, and forming the most important of the Windward group. It is forty-two miles long, from ten to twenty miles wide, and has an area of 380 square miles. The Spaniards discovered it in 1493, on St. Martin's day. It was first settled by the French in 1635, and has since been a French colony, with only several short intervals. At present it is represented in Paris by a senator and two deputies, and has a resident governor and general council, with the seat of government at Fort de France. The climate is favorable, the soil fertile, and it has a number of excellent harbors. Among the chief productions are live-stock, sugar, sweet potatoes, coffee, cacao, rum, tobacco, cotton, and tropical fruits. Its export and import trade with France is extensive. St. Pierre has a fine harbor and is the largest city. In 1902 the volcanic eruptions of Mount Pelée overwhelmed St. Pierre and its vicinity, causing the death of 30,000 people. Martinique has a population of 195,375, of which 15,000 are whites.

MARTINSBURGH, a city in West Virginia, county seat of Berkeley county, situated in the Shenandoah valley, about eighty miles west of Washington. It is conveniently connected by railroads, has a fine school system, and numerous municipal facilities. There are manufactures of bicycles, woolen goods, machinery, hardware, agricultural implements, lime, carriages, and hosiery. Its trade in farm produce and manufactures is important. It has a fine courthouse and other public buildings. Population, 1900, 7,564.

MARTIN'S FERRY, a city of Ohio, located in Belmont county, on the Ohio River. Its trade by railway and river navigation is extensive. The manufactures include engines, stoves, hardware, farming implements, glass, lumber products, and vehicles. An abundance of coal is produced in the vicinity. There are modern municipal facilities and a well organized system of public instruction. Population, 1900, 7,760.

MARTIUS (märt'se-o͞os), **Carl Friedrich Philip von**, traveler and naturalist, born in Erlangen, Germany, April 17, 1794; died Dec. 13, 1868. In 1814 he graduated from the University of Erlangen, and, after publishing several works on botany, he joined an expedition under Spix for scientific investigation of the plants of Brazil in the interest of the Bavarian and Austrian governments. After penetrating a number of provinces in southeastern Brazil, he ascended the Amazon River, and in 1820 returned to Europe with a rare collection of plants and animals. Soon after he published much valuable information regarding the geography and products of Brazil. He was made conservator of the botanical garden at Munich in 1820, and six years later became professor of botany at the university in that city, holding the two positions till 1854. His publications include "Journey to Brazil;" "Plants and Animals of Tropical America;" "Habits and Diseases of Brazilian Indians;" "Ethnography and Language of Indians," and "Plants, Animals and Products of Brazil."

MARTYN, Henry, missionary, born in Truro, England, Feb. 18, 1781; died Oct. 16,

1812. He graduated at Cambridge, studied theology, and in 1805 joined the East India Company as chaplain. After learning the Indian language at Serampore and Cawnpore, he made translations of the New Testament, the Psalms, and several books on religious matters into native dialects. Subsequently he traveled extensively through India, establishing everywhere a favorable impression of Christianity and civilized arts.

MARTYR (mär'tẽr), a word derived from the Greek equivalent of memory or witness, and applied by the Christian churches to a person who suffers death rather than renounce his religion, thus bearing witness to the truth by surrendering his life. In the early history of Christianity, and also during many periods up to modern times, widespread persecutions were frequent, and many suffered death rather than forsake the Christian cause. Prayers were offered at the tombs of the martyrs by Christians, and in many cases praise services were conducted that persons would so willingly and positively maintain the faith. Martyrology is a discourse or treatise containing a list of saints and martyrs, with brief notices of their life and death, commemorated on each day of the year. The earliest treatise of this character was published in the 9th century, and the most extensive appeared in 1586, written by Cardinal Cæsar Baronius (1538-1607), who connected with it critical commentaries.

MARX (märks), **Karl**, socialist and author, born in Treves, Germany, May 5, 1818; died March 14, 1883. He was the son of a celebrated jurist, studied law and philosophy at Bonn and Berlin, and in 1841 became editor of the "Rheinische Gazette," a periodical devoted to the dissemination of social democracy. This periodical was suppressed in 1844, when Marx settled in Paris, where he published a newspaper called "Progress," and also the "German-French Annuals." In 1845 he was exiled from France, when he settled at Brussels, and there became a leading factor in the revolutionary movement of 1848, being the recognized head of socialism. After the Revolution he settled in London, where he published his "Criticism of Political Economy" in 1859, and established a powerful socialist organization known as the International Society. Subsequently he visited the United States, and on returning to Europe became the principal factor in holding together and extending the influence of social democracy in Germany. In 1867 he published his celebrated work, entitled "Capital," which has since been regarded the most masterful and scholarly treatise of the relation between capital and labor ever published. It not only shows vast comprehensive ability and knowledge of social questions, but holds rank as the most reliable text on socialism. He also published works entitled "Philosophy of Proudhon" and "Herr Vogt."

MARY, The Blessed Virgin, the mother of Jesus, who is highly venerated by all Christians. Some authorities think that the genealogy in Luke is that of Mary, considering Heli to have been her father (Luke iii, 23), while others consider her the daughter of Joachim and Anna. Positive information of her life begins with her betrothal to Joseph, and the incidents attending immaculate conception and the infancy of Christ. The New Testament mentions her in several places, but always in relation to Christ, three of the references to her being made during the public ministry of Christ and one after his death. It is not asserted positively in Scripture whether she had other children besides Jesus, but that theory is held by some, being based on the fact that Jesus is called her first-born son, and that several individuals are mentioned as brothers of the Lord. Her life is described as one of great piety, and it is especially stated that she was persevering in prayer. According to tradition she dwelt with John at Jerusalem after Christ's ascension, where she died, but some writers think that she retired with John to Ephesus after the siege of Jerusalem. Writers generally agree that her death occurred in the year 48 A. D., or in 63. The Roman Catholic church gives to the Virgin Mary especial devotion, which has been designated as Mariolatry by churches holding that she is not entitled to special veneration.

MADONNA.

MARY I., queen of England, daughter of Henry VIII. and Catharine of Aragon, his first wife, born at Greenwich, Feb. 18, 1516; died Nov. 17, 1558. She was noted in her youth for singular natural ability to learn and became the favorite of her father, who betrothed her to Charles V. of Spain in her seventh year. On account of her strong attachment to her mother, she was in danger of losing her life when her father secured a divorce, and she was further endangered in refusing to embrace the faith of the church of England. Her father's will entitled her to succession, and when Edward IV. died, on July 6, 1553, she ascended the throne. This consummation was opposed by an attempt under the leadership of the duke of Northumberland, to set her aside in favor of Lady Jane Grey, but the people favored Mary and she entered London amid much rejoicing on August 3, thus deposing Lady Jane Grey, who had been declared queen on July 10. The marriage engagement with Emperor Charles V. had been broken off at

the time Henry VIII. sought a divorce from Queen Catharine and Mary was free to marry Philip II. of Spain, which she did in 1554. This course was protested against in England, and, after its accomplishment, the queen began to influence the movement for a complete restoration of the Catholic worship. Previous to the marriage she had sanctioned the execution of Northumberland and several others, but now extended persecutions began by which she became known as "the Bloody Mary." Cardinal Pole became the legate of the pope, a change in religious faith was urged everywhere, and about 300 martyrs suffered death at the stake. Philip II. proved a selfish and heartless husband, and Mary's domestic life was wretched and lonely. Philip induced her to declare war against France, which resulted disastrously to England and caused Calais to be lost after having been an English possession nearly 200 years. The queen had no children, and died after much suffering from nervous debility and dropsy. Alfred Tennyson made her the subject of a tragedy.

MARY II., queen of England, eldest daughter of James, duke of York, afterward James II. of England, and his first wife Anna Hyde, born in London, April 30, 1662; died Dec. 28, 1694. She was educated in the Protestant faith, married the prince of Orange, afterward William III., on Nov. 4, 1677, and was proclaimed joint-sovereign with him on Feb. 12, 1689. She arrived in England on the following day, and the coronation took place in April, when she was inaugurated like a king. Her death resulted from smallpox. The remains were buried in Westminster Abbey.

MARYLAND, one of the thirteen original states of the United States, whose northern boundary is formed by Pennsylvania, eastern by Delaware and the Atlantic Ocean, and southern and western by Virginia and West Virginia. Its length from east to west is 195 miles, greatest breadth about 120 miles, and area 12,210 square miles, about one-fourth as large as New York. The larger part of the state is included in the Atlantic coast plain, but in the western portions are ranges of the Blue Ridge and Alleghany Mountains, which rise to peaks about 3,500 feet above sea-level. Chesapeake Bay extends almost to the northern boundary, and with the Atlantic Ocean furnishes an important coast line. Its shores are indented by many important bays, and in several of them are excellent harbors. The drainage is toward the southeast, the principal rivers being the Susquehanna, Potomac, Youghighemy, Severn, Choptank, and Pocomoke. Its climate is generally healthful. In the summer the temperature averages about 75° and in winter 35°. At Baltimore the mean annual temperature is 56°. The annual rain-fall ranges from thirty-five to forty-eight inches, being greatest on the coast plain.

Maryland has productive deposits of coal, copper, iron, limestone, granite, and marble. Most of the mining industries are toward the western part of the state and in the mountains. There are also valuable deposits of iron and building-stone in the vicinity of Baltimore. Fine timbers abound in the western section of the state, consisting principally of oak, chestnut, pine, hickory, and walnut. Farming is an important industry, the annual yield of corn being valued at $6,500,000; wheat, $7,750,000; oats, $490,000; rye, $205,000, and hay, $3,600,000. There are also considerable productions of buckwheat, potatoes, and many varieties of fruit. The live-stock comprises horses, mules, milk cows, other cattle, sheep, and swine. Vegetables of all kinds are cultivated extensively, especially garden produce, tomatoes, and melons. The manufactures and commercial enterprises are vast, and are centered more particularly in Baltimore, though there are considerable industries in other cities.

The manufacture of tobacco is among the most extensive, and, besides it, there are considerable productions of spirituous liquors, machinery, cotton and woolen goods, flour, steamships, engines, clothing, hardware, and scientific instruments. The fisheries of Chesapeake Bay and the Atlantic coast are very important, a large portion of the product being canned or shipped for consumption in a fresh state. Besides oysters and other shell-fish, there are important products of the finny tribe, and also the culture of food fishes, including that of shad, bass, trout, carp, and perch. The first railroad in the United States was the Baltimore and Ohio, which was incorporated in 1827. At present the railroad lines in the state aggregate about 1,500 miles. The two most important canals are the Chesapeake and Delaware and the Chesapeake and Ohio, and the rivers also afford convenient navigation facilities.

Maryland has an excellent system of public education, common schools being maintained in all sections of the state, and these are supplemented by a system of high schools, normal training colleges, and other institutions of higher learning. Charitable, benevolent, correctional, and penal institutions are supported by liberal appropriations. The non-sectarian institutions include Johns Hopkins University, Baltimore; St. John's College, Annapolis; and Washington College, Chestertown. Various special and denominational institutions are maintained, principal among them being Loyola College, Baltimore; St. Mary's College, Mount St. Mary's; Morgan College, Baltimore; Rock Hill College, Ellicott City; Western Maryland College, Westminster; and St. Charles College, Ellicott City. Baltimore is the seat of the state prison. Religious and scientific societies of all principal organizations are maintained; so also are libraries, museums, and educational and fraternal associations. The

state has about 225 periodicals, of which twenty are dailies and 150 weeklies.

The first settlements in Maryland were made by Cecil Calvert, Lord Baltimore, in 1634. His father, George Calvert, was secretary of state under James I., became associated with the London Company, and conflicts arose with traders who made claims under the Virginian, William Clayborne. Religious toleration was extended to all, but the Protestants outnumbered the Catholics after 1691. The feudal system of land had been established, but this was overthrown in 1688, when the representatives of Lord Baltimore declined to proclaim William and Mary as ruling sovereigns. The charter first granted included Delaware and a part of Maryland, but final adjustments were made in 1760, and Mason and Dixon's line was established to mark its present limit in 1763-67. The articles of confederation adopted by congress in 1777 were not ratified till in 1781, but Maryland actively supported the Revolutionary War. It also supported with alacrity the War of 1812, and the Mexican War, and, though a slave-holding state, it did not secede from the Union in the Civil War, but many of the citizens joined each of the armies. The state is divided into twenty-three counties. Annapolis is the capital. Other important cities are Baltimore, Hagerstown, Cumberland, Frederick, and Lonaconing. It is popularly called the Old Line State. According to the census of 1900 it has a population of 1,190,050. This includes a total colored population of 235,620, or 19.8 per cent., of which 235, 064 are Negroes and 544 Chinese.

MARY MAGDALENE. See **Magdalene.**

MARY STUART, Queen of Scots, born in the palace of Linlithgow, Scotland, Dec. 8, 1542; executed Feb. 8, 1587. She was the daughter of James V. of Scotland and Mary of Lorraine, a daughter of the duke of Guise of France. Her father died when she was but a few days old, and she succeeded him as sovereign. On Sept. 9, 1543, the coronation ceremony was performed upon the infant; the earl of Arran was made regent, and she was shortly after promised in marriage to Prince Edward of England, but the parliament of Scotland annulled the betrothal. Soon after she was betrothed to the dauphin of France, afterward Francis II., and in 1548 she was taken to France, where she received an education at the French court and in a convent. In 1558 she married the dauphin, who succeeded Francis I. as king on July 10, 1559, but the young king died on Dec. 5, 1560, when Mary was deprived of the reigning power by the queen mother, Catharine de Medici, as regent for her son, Charles IX.

MARY QUEEN OF SCOTS.

The widowed queen returned to Scotland in 1561, evading on the route the vessel sent by Elizabeth of England to capture her. Though many suitors were proposed to her in marriage, she wedded her cousin Henry Stuart, Lord Darnley. This action caused the Protestants to organize formidable opposition, since both Mary and her husband were Catholics, and they were soon after forced to seek safety in England. In the contest Mary showed much bravery, taking the field in person, and displaying an unusual patriotism in defending law and her rights. However, it soon became apparent that Darnley sought to secure supreme power, and by his reckless disposition both alienated the queen and caused her to decline in popularity. David Rizzio was Mary's chief minister. He was on intimate terms with Darnley, but the latter assumed that he stood in the way of the crown, and accordingly formed a conspiracy by which Rizzio was murdered on March 9, 1566, Darnley taking an active part in the crime. The latter at once attempted to assume complete control of Scotland, but in this he was prevented by the ingenuity of Mary, and, when their son was born, who afterward became James VI. of Scotland and I. of England, an apparent reconciliation was effected, but it was neither impressive nor lasting. The earl of Bothwell now became a principal adviser of Mary, and in 1566 took a prominent part at the baptizing of James at Stirling Castle. Darnley soon after became stricken with smallpox at Glasgow, where he was cared for by his father, and later Mary had him removed to Edinburgh. While there he was personally attended by Mary, but on Feb. 10, 1567, the house in which he was cared for was blown up by gunpowder and he was killed. Suspicion was attached to Bothwell and also to Mary as having planned his death, and about three months later the two were married.

The Scottish nobles formed a compact against Bothwell and Mary, and on July 29, 1567, she was compelled to abdicate the throne to her son, who became king under the regency of the earl of Moray, but Bothwell escaped to Denmark, while Mary was kept in captivity. Several friends succeeded in effecting her escape from Loch Leven on Nov. 2, 1568, when she gathered an army of 6,000 men to regain power, but was defeated in the battle of Langside, and fled to England for protection by Elizabeth. Mary having claimed the right of succession to the English throne as the great-granddaughter of Henry VII., Elizabeth imprisoned her for eighteen years. Many attempts were made to secure her liberation, all of

which failed, and at last some of her enemies charged that she was implicated in a conspiracy to assassinate Elizabeth, and accordingly secured her trial and condemnation, the conviction taking place Oct. 25, 1586. Elizabeth refused to sign the death warrant for a long time, but she yielded at last on Feb. 1, 1587. Mary displayed singular courage, protested her innocence to the very last, and, when she was brought to the block on Feb. 8, she conducted herself with the dignity and courage of a heroine. Writers have generally agreed that Mary was a woman of rare intellect, skilled in music, accomplished in languages, and possessed of rare personal charms. She remained a devout Catholic, and in the last services uttered a prayer instead of listening to the attending chaplain. She has been made the subject of many literary gems, among the most beautiful being Schiller's "Mary Stuart."

MARYSVILLE, county seat of Yuba county, California, located at the confluence of the Feather and Yuba rivers, about forty miles north of Sacramento. It has good schools, railroad connections, and a number of modern municipal facilities. There are manufactures of flour, woolen goods, machinery, carriages, wine, and canned goods. The surrounding country is mining. Population, 1900, 3,497.

MASACCIO (mä-sät'cho), also known as Tommaso Guidi, celebrated painter, born in the Arno valley, Italy, about 1401; died at Rome in 1443. He went to Florence for study and also executed much of his excellent work in that city. His productions comprise a number of excellent frescoes, including those in the Church of St. Clement at Florence. Among his excellent paintings are "Temptation of Adam and Eve;" "Expulsion from Paradise;" "Peter and the Tribute Money," and a number in connection with the miracles of Christ and scenes in the lives of the apostles.

MASANIELLO (mä-sä-ne-ĕl'lo), known also as Tommaso Aniello, Italian revolutionist, who organized a revolt against Spanish authority in July, 1647. He was a fisherman at Amalfi, Italy, where he was born in 1623. When oppressive taxes were levied, he joined others in making armed resistance, and soon after became leader of the opposition. The revolt assumed such extensive proportions that many of the custom houses were seized, palaces destroyed, and outraged justice enthroned. Later Masaniello became addicted to strong drink, and during a fit of excitement inaugurated a reign of terror, in which much property and life were destroyed. He was assassinated in Naples on July 16, 1647.

MASAYA (mä-sī'ä), a city of Central America, situated in Nicaragua, near a lake of the same name, about twenty-five miles northwest of Granada. It has railroad connections, is one of the oldest cities in Nicaragua, and has an important trade and some manufactures. Near it is the celebrated volcano of Masaya, which in 1670 had an eruption that spread lava in a northerly direction fully twenty miles. The inhabitants of the city are largely of Indian descent and have considerable advancement in the industries. Population, about 16,500.

MASHONALAND (ma-shō'na-lănd). See **Rhodesia**.

MASON, George, statesman, born at Doeg's Neck, Virginia, in 1726; died Oct. 17, 1792. He settled at Mount Vernon, where he formed an intimate friendship with Washington, and in 1775 was made a member of the Virginia committee of safety, which became responsible for the government of that colony. He drafted the declaration of rights and a new constitution for Virginia in 1776, and in 1787 served as a member of the convention which drew up the national constitution. Several provisions of the constitution were objectionable to him, on account of which he joined Patrick Henry in opposing its adoption in the Virginia assembly, and later identified himself with the anti federalists. He declined serving in the continental congress, and also as United States senator from Virginia after having been elected, and retired from public life to his home on the Potomac. His statue is included with that of Jefferson, Henry, and others in a group surrounding the statue of Washington, which occupies a position at the front of the capitol in Richmond, Virginia.

MASON, Jeremiah, jurist and statesman, born in Lebanon, Conn., April 27, 1768; died in Boston, Mass., Oct. 14, 1848. In 1788 he graduated at Yale, three years later was admitted to the New Hampshire bar, and entered upon the practice of law at Westmoreland. He was elected attorney-general of the state as a federalist in 1802, was a United States senator in 1813-17, and subsequently served in the state legislature several terms. In 1832 he opened an important law practice in Boston, taking rank as an advocate with such men as Daniel Webster and Judge Story.

MASON, Lowell, musician, born in Medfield, Mass., Jan. 8, 1792; died Aug. 11, 1872. His aptitude for music was so marked that he became a teacher of singing classes and a choir at the age of sixteen, and in 1812 settled at Savannah, Georgia, where he developed a reputation for musical talent. He removed to Boston in 1827, and there effected much improvement in musical sentiment and its public appreciation. With others he helped to found the Academy of Music in Boston, and in 1837 visited extensively in Europe. The University of the City of New York conferred a degree upon him in 1855. He published many collections of songs set to music for Sunday-schools, churches, and glee clubs, and is perhaps the best known composer of church music in America. His

most important work was published in 1822, entitled "Handel and Haydn Society's Collection of Church Music."

MASON AND DIXON'S LINE, the boundary line between Pennsylvania and Maryland, and so named from Charles Mason and Jeremiah Dixon, two English surveyors, who located it between the years 1765 and 1767. A portion of this line was completed by others, the two surveyors not finishing the survey entirely. It passes along 39° 43′ 26.3″. When the Missouri compromise was before congress for discussion, John Randolph of Virginia applied the phrase to designate the line between free and slave territory, and the term came into popular use. However, Mason and Dixon's line as applied to slave territory passes from the boundary between Pennsylvania and Maryland down the Ohio to the Mississippi and thence west on the parallel of 36° 30′, this being the southern boundary of Missouri, though Missouri was a slave state. The original Mason and Dixon's line was designated by milestones located at points five miles apart, on one side of which was cut the coat of arms of Lord Baltimore, and on the other side that of William Penn.

MASON CITY, a city in Iowa, county seat of Cerro Gordo county, about 110 miles northeast of Des Moines. It is surrounded by an excellent farming and dairying country. There are extensive railroad connections, excellent schools and churches, and good municipal facilities. Among the manufactures are flour, earthenware, machinery, and vehicles. Building stone is quarried in its vicinity. The city has a fine county courthouse, and is the seat of the Iowa Odd Fellows' Home. Population, 1900, 6,746.

MASS, the prayers and ceremonies offered by the Roman Catholic Church in connection with the perpetual sacrifice of the new covenant, in which the body and blood of Christ are held to be really and truly offered to God under the species of bread and wine. The mass as held at present embraces four principal parts: the introduction, sacrifice, consecration, and communion. A mass held on an extraordinary occasion is called the votive mass; the ordinary mass performed by the priest without music is called low mass. When celebrated with the assistance of a deacon or other clergyman and accompanied by vocal and instrumental music, it is known as high mass. All are expected to hear mass on holy days of obligation and on all Sundays.

MASS, a term used in physics to designate the quantity of matter which a body contains. It is precisely proportional to the weight of the body and embraces the sum of all the material particles of the body. Two bodies are regarded of equal mass, if they exactly balance each other when placed in opposite scales in vacuo.

MASSACHUSETTS, one of the thirteen original states of the United States, bounded on the north by Vermont and New Hampshire, east by the Atlantic Ocean, south by Rhode Island and Connecticut, and west by Rhode Island and New York. Its length from east to west is about 175 miles, breadth forty-eight miles, and area 8,315 square miles, about one-fifth as large as Ohio. The eastern half of the state is located in the Atlantic coast plain, while the western portion contains ranges of the Green, Hoosac, and Taconic mountains. The highest peak is Saddleback, elevation 3,500 feet, a mountain of the Taconics, while Greylock approximates the same elevation. The coast is irregular, being indented by many excellent bays, among them Massachusetts Bay, Cape Cod Bay, and Buzzards Bay. Several fertile islands belong to the state, the most important being Nantucket and Martha's Vineyard. There are fully 250 miles of sea frontage, besides a number of navigable streams and canals. Principal among its rivers are the Connecticut, Merrimac, Taunton, Millers, Deerfield, and Nashua. Cape Cod and Cape Ann are the principal extensions into the Atlantic. The mean average temperature at Boston is 49°, the climate healthful, and rainfall abundant in all portions of the state to insure the germination and maturing of plants.

A large portion of the state is susceptible to cultivation, the principal crops being corn, barley, hay, potatoes, rye, buckwheat, oats, tobacco, and many varieties of fruits. The production of hay is the most valuable, representing an annual value of $10,250,000, and next to it is the potato crop with a valuation of $2,050,000. Live-stock comprises principally milk cows, other cattle, horses, sheep, swine, and mules. There are few wild animals and game birds, and the virgin forest has been almost totally utilized. It has quantities of valuable minerals, the most important being granite, in the production of which the state holds first rank. Other mineral products include marble, limestone, sandstone, and a limited output of coal. The state is essentially manufacturing, and in this line presents industries embracing a vast capital. At present the value of manufactures produced annually represents an average total of about $975,000,000. The principal products embrace cotton and woolen goods, machinery, boots and shoes, spirituous liquors, cigars, clothing, woodenware, leather, and metallic goods. The fisheries are also of vast importance, the different classes including herring, lobster, and shad, besides numerous varieties propagated in interior waters. Its railroad lines aggregate 2,250 miles.

Massachusetts has long ranked as a state of high standing in educational affairs, having attained that distinction through Horace Mann and other prominent educators. The public school system is organized thoroughly with fine courses of study, and free instruc-

tion is extended to many of the higher branches. In the rural districts the schools have been consolidated generally, and children are transported to central schools at public expense, thus practically giving them the advantages of the higher schools. The state maintains benevolent, reformatory, and penal schools of all classes, while there are many asylums and hospitals maintained under private and municipal control. Among the principal educational institutions of higher rank may be named the Boston University and College, Boston; Harvard University, Cambridge; Amherst College, Amherst; Williams College, Williamstown; College of the Holy Cross, Worcester; Mt. Holyoke College, Tufts College, Worcester Polytechnic Institute, Wellesley College, Clarke University, Smith College, Massachusetts Agricultural College, and Boston Institute of Technology. All the leading churches have excellent church homes, many of them representing much value. Numerically, the leading organizations take rank as follows: Congregational, Methodist, Roman Catholic, Baptist, Protestant Episcopal, Unitarian, and Spiritualist. In Boston and other cities are many excellent educational and scientific associations. The state has 740 periodicals, of which number eighty are daily, 460 weekly, and twelve semi-weekly. The libraries of Massachusetts are among the finest in America, and are distributed among the various cities and educational institutions.

Massachusetts is known as the Bay State, and was named from an Indian word meaning "the great hills," a term derived from the Blue Hills near Boston. It is thought that the Norsemen first sighted Massachusetts in the year 1001. The Cabots explored a portion of its coast in 1497, but extended explorations were first made by John Smith in 1614. In 1620 the Pilgrim Fathers landed with the Mayflower at Plymouth, where the first permanent settlement was made. John Endicott settled with a company of Puritans at Salem in 1628, and this settlement with those of Boston, Lynn, and others became known as the Massachusetts Bay Colony. War with the Indians caused the colonists to suffer many hardships, especially those with the Pequots in 1637, and under King Philip in 1675-76. The Puritan religion was made obligatory in the early history of Massachusetts, and traces of laws requiring some form of worship continued until 1833. In the Revolutionary War the state was recognized as a leader, the first battles occurring at Lexington and Bunker Hill. It also entered with enthusiasm into the War of 1812, supported the Union cause in the Civil War, and has given to the nation many eminent statesmen and military leaders. Boston is the capital and largest city of the state. Other cities of importance are Worcester, Fall River, Lowell, Cambridge, Lynn, Lawrence, Springfield, New Bedford, Summerville, Salem, Holyoke, Brockton, Chelsea, and Haverhill. There are fourteen counties in the state. The census of 1900 gives the population at 2,805,346. This includes a colored population of 35,582, or 1.3 per cent. of the entire number, including 31,974 Negroes. Of the entire population 48.7 per cent. are males.

MASSACHUSETTS BAY, a coast indentation of Massachusetts, extending from Cape Ann to Cape Cod. It has an irregular coast, includes numerous small islands, and within its coast lines are Cape Cod Bay, Plymouth Bay, and Boston Bay. The bay is important for its commerce and fisheries.

MASSACHUSETTS INDIANS, the Indians found in the territory included in Massachusetts, and who consisted of five Algonquin tribes. The lands around Massachusetts Bay were inhabited by the Massachusetts tribe; the Nipmucks resided in the central portion, the Pennacooks in what is now New Hampshire; the Pokanokets in the southeastern part of the state; and the Nausets in the vicinity of Cape Cod. All except the Nausets were friendly to the colonists, but this tribe entered into a treaty of peace with the Plymouth settlers. In 1644 missions were established on Martha's Vineyard, and in 1651 John Eliot gathered at Natick the converted Indians, who were termed praying Indians. Eliot also translated the Bible into the Indian language, and in 1674 there were 3,200 who had embraced Christianity. King Philip led an Indian insurrection in 1675, when all the Massachusetts Indians became participants, and both whites and converted Indians were attacked by the savages. The war ended the following year with the death of King Philip, after which some of the leading members were sent to the West Indies, others settled westward and in Canada, and those remaining became peaceable and have been largely assimilated by intermarrying with whites and Negroes.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, a noted co-educational institution in Boston, Mass. It was established under grants from congress in 1861. The institution has courses of study in manual training and higher branches of science. It is attended by 1,350 students, and has a library of 50,000 volumes.

MASSAGE (măs'säj), a method of treating the body for the cure of diseases. It consists of systematic manipulations, including surface friction, kneading, manipulations with the tips of the fingers, and striking or percussion with the hands. These procedures are administered daily, and are combined according to definite rules, the treatment varying according to the nature of the disease and the locality affected. It has been found of much service in treating rheumatism, paralysis, neuralgia, joint diseases, diabetes, and many others.

MASSASOIT (măs'sa-soit), an Indian

chief of the Pokanokets or Wampanoags, born in Massachusetts about 1580; died in 1661. The tribe over which he had control occupied the region from Narragansett Bay to Cape Cod Bay. It numbered about 25,000, but many of the members died of a contagious disease before permanent settlements were made. In 1621 a treaty of peace was made with the whites under his approval, and was honorably kept by the Indians affected by it for fifty-four years. Massasoit was honorable in dealing with the whites. He always showed a spirit of friendliness, and cultivated the arts of peace. He resided in the vicinity of what is now Warren, Rhode Island, where he was visited by numerous commissioners from the settlements. He also entertained Roger Williams after his banishment from Massachusetts, who remained there several weeks before going to Providence. Alexander and King Philip were his sons, the latter being the famous leader of King Philip's War.

MASSENA (mä-sä-nä'), **Andre**, marshal of France, born at Nice, Italy, May 6, 1758; died April 4, 1817. He descended from parents in humble circumstances, became a cabin boy on a small vessel, and in 1772 joined the Sardinian army. In 1775 he enlisted in a battalion of volunteers in the pay of France, and in 1793 was promoted to the rank of general of brigade. Soon after he distinguished himself by commanding the French army in Italy, winning the famous victory of Loano while in charge of the right wing of the army. He secured command of the army in Switzerland in 1799, defeated the Russians at Zurich, thereby making invasion of France impossible, and in 1804 Napoleon rewarded him by making him commander of the army of Italy and marshal of the empire. At the battle of Aspern he showed much bravery; in 1810 he compelled the British and their allies to retreat to Lisbon, but, being unable to defeat Wellington at Torres Vedras, he resigned his commission. However, he held an important command during the Russian campaign, but after Napoleon's return from Elba he refused to accept positions of responsibility, and soon after went over to the Bourbons, who created him a peer, a rank confirmed by Louis XVIII. Massena ranks as one of the most efficient generals under Napoleon; was quick to comprehend the advantages of situations, and executed his designs with masterful accuracy. Napoleon created him duke of Rivoli, later prince of Esslingen, and, when he refused to further champion Napoleon's cause, the royalists made cruel attacks upon him, and apparently forgot his able support when success was possible for the royal cause.

MASSEY (măs'ĭ), **Gerald**, poet, born in Tring, England, May 29, 1828. He descended from poor parents, received only a limited education, and began to work in a silk factory when eight years of age. In 1843 he became an errand boy in London, six years later was made editor of the "Spirit of Freedom," and became recognized as a leading Christian socialist. His "Ballad of Babe Christabel and Other Poems" appeared in 1854, and before the end of the year went through five editions. In 1852 he attracted attention as a lecturer on spiritualism and hypnotism, and visited America, Australia, and many countries of Europe, everywhere attracting interested audiences. His writings embrace "Concerning Spiritualism;" "Tale of Eternity and Other Poems;" "Robert Burns and Other Lyrics;" "My Lyrical Life," and "Secret Drama of Shakespeare's Sonnets."

MASSILLON (măs'ĭl-ŏn), a city of Ohio, in Stark county, on the Tuscarawas River, eight miles east of Canton. It is extensively connected by railroads, surrounded by a rich agricultural country, and in its vicinity are productive coal mines. The manufactures embrace threshing machines, iron bridges, hardware, engines, glass, flour, and machinery. It has electric lights, a sanitary sewer system, waterworks, street railways, and excellent public schools. Population, 1900, 11,944.

MASSILLON (măs'ĭl-lŏn), **Jean Baptiste**, noted clergyman, born at Hyères, France, June 24, 1663; died at Clermont, Sept. 18, 1742. In 1681 he entered the Congregation of the Oratory for the purpose of studying theology, a line of work for which he had shown a preference from his early youth, and afterward became a teacher of theology. His first pulpit essay was made at Vienne, and a funeral oration on the archbishop of Vienne gave him a reputation among the superior pulpit orators of France. In 1699 he preached for the first time before Louis XIV., who was deeply impressed with his eloquence. He was made bishop of Clermont in 1717, was appointed to preach before Louis XV. in the same year, and two years later was elected a member of the Academy. The funeral oration of the duchess of Orleans in 1723 was his last public discourse in Paris, after which he took an active part only for his diocese. Among the many excellent sermons delivered by this noted divine are his discourses on "The Death of the Just and Unjust;" "For Christians," and "Prodigal Son." The complete works of Massillon were published in fourteen volumes in 1745-46.

MASSON (măs'ŏn), **David**, author and educator, born in Aberdeen, Scotland, Dec. 2, 1822. He studied at the University of Edinburgh, began a literary career at the age of nineteen, and in 1859 was made editor of "Macmillan's Magazine." In 1865 he was appointed professor of rhetoric and literature in the University of Edinburgh, became Rhind lecturer in 1875, and contributed many articles of value to various publications. His writings include "Life of John Milton;" "Essays, Biographical and Critical;" "Brit-

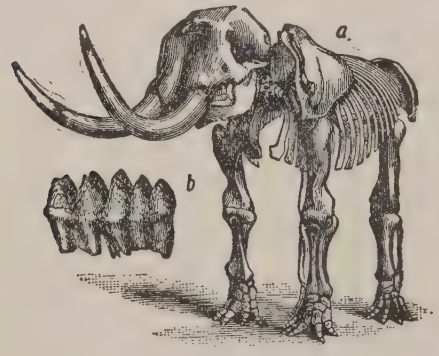
ish Novelists;" "Recent British Philosophy," and lives of Shelley, Keats, and Wordsworth.

MAST. See **Ships.**

MASTICATION (măs-tĭ-kā′shŭn), the process by which the food is divided and mixed with the salivary secretion, preparing it for the further action of the stomach. Mastication is performed by action of the lips, teeth, and mouth, and digestion depends largely upon its thoroughness. Indigestion often results from imperfect mastication. In infants and the lower animals it is instinctive, and in adults largely voluntary.

MASTIFF. See **Dog.**

MASTODON (măs′tŏ-dŏn), a genus of elephants now extinct, and of which fossil remains occur in America as late as the Post-



MASTODON.
a, skeleton; *b*, molar tooth.

Pliocene period. In Eurasia they occur from the middle of the Miocene to the end of the Pliocene, when the animals became extinct. The mastodons closely resembled existing species of elephants, differing from them mainly in the formation of the teeth. They had a vaulted and cellular skull, large tusks in the upper jaw, and a heavy form. Remains found in America indicate that they approximated a height of twelve feet and a length of eighteen feet. The first complete skeleton found in America was secured in Orange county, New York, in 1801.

MATAMOROS (măt-a-mō′ros), a city of Mexico, situated in the state of Tamaulipas, on the Rio Grande River. It has regularly platted streets and good transportation facilities. There is a large trade in cotton, silk, flax, and woolen goods, tobacco, flour, hides, and machinery. The city has a fine cathedral and other churches. It is also the seat of several schools and government buildings. Population, 21,200.

MATAMOROS, Mariano, revolutionary leader and patriot of Mexico, who was among the first to head the revolution against Spain. His birth and early life are unknown. The first authentic date occurs in 1811, when he was a priest at Jantelolco, and was made colonel of the military forces in defense of Cuautla. While there he was aided by his fellow priest Morelos, and in 1813 defeated the imperial forces at Augustin de Palmas. Later his forces were repulsed at Valladolid, owing largely to a rash movement led by Morelos, and later at Puruaran, where Matamoros was taken prisoner in 1814. The Spanish general refused to exchange him for 200 prisoners, and he was shot Feb. 3, 1815, at Valladolid; Morelos immediately executed the 200 prisoners in reprisal. Matamoros is regarded the ablest leader of the first revolution, and so designated in Alaman's "History of Mexico." The city of Matamoros was named in his honor, and his remains are preserved in the cathedral of the city of Mexico, together with those of the other two leaders, Morelos and Hidalgo.

MATANZAS (ma-tăn′zas), an important seaport of Cuba, situated fifty-four miles east of Havana. It is extensively connected by railways, has a fine harbor on the Bay of Matanzas, and since the Spanish-American War there have been many municipal improvements. Its manufactures embrace tobacco products, sugar, clothing, and machinery. The export and import trade is of growing importance, embracing principally sugar, coffee, cigars, spirituous liquors, machinery, utensils, fabrics, and earthenware. Public schools are maintained in all parts of the city, and there are a number of fine churches, higher institutions of learning, and numerous periodicals. Population, 1899, 36,374.

MATCHES, the articles manufactured for the purpose of starting a fire, and consisting principally of splinters of soft wood tipped with a combustible composition that ignites by friction. Fire for domestic and other purposes was obtained up to the beginning of the last century with sulphur-tipped splints of wood, that were lighted with tinder ignited by steel and a flint. Attempts to use a chemical agency were not made until 1805, when splints of wood were coated with sulphur and tipped with a mixture of sugar and chlorate of potash. To obtain fire it was necessary to bring the match in contact with the contents of a bottle consisting of asbestos, saturated with strong sulphuric acid. The first friction match with a phosphorus tip was made in France in 1816, but friction matches did not come into general use until in 1827, when John Walker, a druggist of Stockton, England, invented a wooden match tipped with sulphur and a mixture of sulphide of antimony, chlorate of potash, and gum. Several improvements were made in 1833, and since then the manufacture has been largely by labor-saving machinery.

In 1855 the first safety matches were made in Sweden. They are so formed that the tips contain only a part of the necessary composition, the other ingredients required being attached to the box, thus making it necessary to bring the two in contact when

lighting. Matches of this character are used extensively on account of not being liable to ignite in case of friction by accident. The wood employed in match-making is largely pine and aspen. It is cut into splints by forcing blocks of the proper length through steel plates containing small holes of the exact size of a match, and afterward fed into machines for dipping the ends into the igniting composition. The important element of the igniting composition is phosphorus, but there are various special mixtures used by different manufacturers. Usually the igniting composition is spread in a shallow basin, into which the tips are dipped, and after proper drying the matches are placed in pasteboard boxes for the market. The poisonous property of phosphorus requires much care in manufacture, and also in their use, since many accidents have occurred on account of carelessly placing them in reach of children. There are important match manufactories in the United States and many countries of Eurasia, particularly France, Germany, Britain, and the Scandinavian countries.

MATERIALISM (mȧ-tē'rĭ-ăl-ĭz'm), the philosophy that denies the existing of any immaterial part in man, and accounts for the universe, embracing man and the systems of nature, by matter alone. Materialism has been divided into two classes, perfect and imperfect materialism. Perfect materialism affirms that there is but one substance in the universe, and that substance is matter. Imperfect materialism is of two classes—one that admits a spirit in man, but none in the universe; while the other admits a spirit in the universe, but none in man. There are numerous schools of materialists, the lines varying from theories scarcely distinguishable from spiritualism to those of persons who, like Jacob Moleschott (1822-1893), believe that the brain secretes thought as the liver secretes bile, and who assert that there is no matter without force, and no force without matter.

MATERIA MEDICA (mȧ-tē'rĭ-ȧ mĕd'ĭ-kȧ), that department of medical science which treats of the different medicines employed for curative purposes. Some writers divide the subject into organic and inorganic substances, while others use an alphabetical arrangement in outlining and describing all the different substances employed, and classify them according to their modes of operation and their effects upon the human body. Materia medica embraces both therapeutics and pharmacology.

MATHEMATICS (măth-ē-măt'ĭks), the science that treats of quantity, the measuring of quantities, and the ascertainment of their properties and relations. It is divided into pure and mixed mathematics. Pure mathematics investigates the properties of abstract numbers and magnitudes, and embraces arithmetic, algebra, geometry, trigonometry, calculus, and other sciences. Mixed mathematics is used in all the physical sciences, such as electricity, magnetism, optics, and in logic and economics. In both pure and mixed mathematics the treatment may be by synthesis or by analysis.

MATHER (măth'er), **Cotton**, clergyman and author, son of Increase Mather, born in Boston, Mass., Feb. 12, 1663; died Feb. 13, 1728. When sixteen years of age he graduated at Harvard College, and in 1684 was ordained assistant minister to his father at the North Church in Boston. The following year he published his "Memorable Providences Relating to Witchcraft and Possessions," a work considered authoritative in dealing with the Salem witchcraft persecutions. It was quite influential in causing the burning of nineteen victims at Salem in 1692. Another work having a widespread influence in these persecutions was his "Wonders of the Invisible World," in which he undertook to prove that witchcraft is a reality. Mather was probably the most learned man in America at the time in which he lived. He had a wide acquaintance with books and foreign languages, and was an aggressive worker in the interest of temperance. His industry and learning were attested by the publication of 382 books, many of which were read by Franklin and other eminent men. His greatest work is "Magnalia Christi Americana," a church history of New England published in 1702. Another work widely read is his "Essays to do Good."

MATHER, Increase, clergyman and educator, born in Dorchester, Mass., June 21, 1639; died Aug. 23, 1723. In 1656 he graduated at Harvard, and two years later at Trinity College, Dublin. In 1661 he was ordained a minister, and preached the gospel in Devonshire and Guernsey, but soon after returned to America, and in 1664 became pastor of the North Church, Boston, in which position he remained until his death. He was president of Harvard from 1685 to 1701. When Charles II. annulled the Massachusetts charter, in 1684, he zealously opposed that sovereign, and was commissioned by Massachusetts to proceed to England for the purpose of securing a new charter for the colony, which he did in 1698. The new charter gave him authority to appoint officers, a task he performed with the greatest public concern. He published ninety-two separate works, labored sixteen hours a day, and was alike influential in the church and state. Few of his publications are now extant. The most important are "History of the War with the Indians;" "Life of Richard Mather," and "Remarkable Providences." He married a daughter of John Cotton.

MATHEW, Theobald, temperance reformer, born at Thomastown, Ireland, Oct. 10, 1790; died Dec. 8, 1856. He studied at the Catholic College of Kilkenny, in 1807 entered the College of Mynook, and took priest's orders in 1814 in the religious order

of the Capuchins. He was first located at Cork, where he entered with much zeal upon the encouragement of total abstinence, and later wielded a marked influence in temperance crusades in various cities of Britain and in New York. It was his custom to present medals to all who would take the pledge of total abstinence, a course by which many lives were reformed. He also founded schools for children, effected social reforms, and contributed liberally to charities. A statue was erected to his memory in Cork, Ireland, and another in New York.

MATSYS (mät-sīs'), **Quentin,** Flemish painter, born in Louvain, Belgium, about 1460; died in Antwerp in 1530. His natural ability as a painter was recognized at an early age, having produced numerous specimens of much merit. In 1491 he settled at Antwerp, where he executed most of his works of excellence. He ranks not only as a noted painter of Scripture scenes, but holds a high place as a portrait painter, and also executed a number of frescoes. The fine finish of his productions as well as their coloring is remarkable. Among the most important are "Martyrdom of John the Baptist;" "Burial of Christ;" "Money Changers," and "Virgin and Child." In the noted galleries of Europe are seventy pictures ascribed to him.

MATTER, in physics, anything which occupies space and prevents other matter from occupying the same space at the same time. It is the agent through which force is manifested. By its properties matter is made manifest through the senses, though the intermolecular and interstellar ether is regarded as matter, but is not perceived by the senses owing to its subtlety. There are three common forms of matter—solid, liquid, and gaseous, all of which have volume; that is, length, breadth, and thickness. Two classes of theories are held as to the ultimate constitution of matter—the theory that regards it as made up of atoms, and the one that considers it as a homogeneous plenum, the former being now generally accepted by scientific men. Matter and mind are commonly regarded as antithetical.

MATTERHORN (măt'tĕr-hôrn), a peak of the Alps, called Mont Cervin by the French and Monte Silvio by the Italians. It is located on the boundary line between Switzerland and Italy, and has an altitude of 14,700 feet. The peak is very steep. It was first scaled by Lord Francis Douglas and several guides on July 14, 1865, when Douglas and three others were killed by falling over a precipice.

MATTHEW, one of the twelve apostles of Jesus, and held to be the author of the gospel that bears his name. He was the son of Alpheus, served as gatherer of Roman customs at Capernaum on the shore of the Sea of Galilee, whence he was called to follow Jesus. His name is mentioned with the list of the disciples, and he is thought to have died a natural death, but some of the later traditions represent him as having been martyred after preaching in Parthia and Ethiopia. The book of St. Matthew is addressed especially to the Christians of Jewish descent. This highly important work is thought to have been published between 41 and 60 A. D., and is the only one of the four gospels that reports at length the Sermon on the Mount. It also gives prominence to other discourses of Jesus, and details the ministry of Christ in Galilee rather than at Jerusalem.

MATTHEWS, James Brander, author and critic, born in New Orleans, Louisiana, Feb. 21, 1852. He graduated at Columbia College in 1873, and shortly after settled in New York to pursue literary work and criticism. He became a lecturer at Columbia College in 1892. His writings include "Americanisms and Briticisms;" "Theaters of Paris;" "Vignettes of Manhattan;" "French Dramatists of the Nineteenth Century;" "Introduction to the Study of American Literature," and "Royal Marine."

MATTHEWS, Stanley, statesman and jurist, born in Cincinnati, Ohio, July 21, 1824; died in Washington, D. C., March 22, 1889. In 1840 he graduated at Kenyon College, was admitted to the bar, and soon after removed to Cincinnati, where he became connected editorially with the "Herald." Subsequently he was elected judge of Hanover county, became state senator, and served as United States attorney in Ohio from 1858 to 1861. In 1861 he volunteered in the Union service, rose to the rank of colonel in the army of the Cumberland, and resigned in 1863 to serve as judge of the Cincinnati superior court. The republicans retained him as counsel before the electoral commission in 1877, and in the same year he succeeded John Sherman as United States senator. President Garfield appointed him associate justice of the United States supreme court in 1881, a position he held until his death. He is noted as an able jurist, many of his decisions giving evidence of much ability.

STANLEY MATTHEWS.

MATTHIAS (mät-tee'ăs), **Corvinus,** king of Hungary, second son of John Hunyady, born at Klausenberg, Hungary, March 27, 1443, died in Vienna, Austria, April 6, 1490. His father served as regent of Hungary, and Ladislaus, king of Hungary and Bohemia, kept him and his brother prisoner in Bohemia. After the death of that king and his brother, Matthias was chosen king of Hun-

gary by the magnates in 1458, but before establishing his supremacy he was compelled to struggle six years against the Turks, Frederick III. of Germany, and the Bohemians. His first ambition was to expel the Turks from his kingdom, which he did, and also gained from them Moldavia, Bosnia, and Wallachia. Next he proceeded against the Bohemians, annexing the territory included in Silesia, Lusatia, and Moravia, in 1478. The following year he again organized an expedition against the Turks, and at Kenyermezo inflicted a decisive defeat upon them. His last notable campaign was that of 1485 against the Germans and Austrians, in which he captured city after city until Vienna was conquered, which he made his capital. Matthias was not only a skilled commander, but a patron of education. He established many institutions of learning, among them the University of Budapest, and surrounded his court with the most eminent men of Germany and Italy. He encouraged agriculture, manufacture, and commerce, and placed in his court splendid sculptures and a library of 50,000 volumes. His death resulted from apoplexy while enjoying the height of prosperity. "King Matthias gone, justice gone," became a common saying after his death.

MATTOON (măt-ōōn'), a city of Illinois, in Coles county, situated in a fertile agricultural country. It is connected by numerous railroads, has modern municipal facilities, and contains manufactures of carriages, machinery, brooms, earthenware, wagons, and utensils. The city has fine school and church buildings. It enjoys a growing trade in produce and merchandise. There are important railroad shops, grain elevators, and fine residences. Population, 1900, 9,622.

MAUCH CHUNK (mąk chŭnk'), county seat of Carbon county, Pennsylvania, on the Lehigh River, and surrounded by productive anthracite coal regions. It is connected by railway with Summit Hill, at which burning mines have existed since 1858. Population, 1900, 4,029.

MAUMEE (ma-mē'), a river formed at Fort Wayne, Indiana, by the confluence of the St. Mary's and St. Joseph rivers, and thence flows northeast into Lake Erie at Toledo. Its total length is 120 miles. It is navigable for ten miles, and during high water about fifty miles, or to Defiance, Ohio.

MAUNA KEA (mou'nä kā'ä), the highest mountain peak of the Hawaiian Islands, situated on the island of Hawaii, about fifteen miles from the northeastern coast. It is a volcano long extinct, has snow at the peak nearly the entire year, and is 16,810 feet above sea-level.

MAUNA LOA (mou'nä lō'ä), an active volcano of the Hawaiian Islands, elevated 13,678 feet above sea-level. It is situated near the center of the island of Hawaii. There are fine forests surrounding the lower altitudes. The craters are numerous, the central one being about 1,000 feet deep, and 8,000 feet in diameter, and new openings are not infrequent. Among the celebrated eruptions of recent years are those of 1880 and 1887, the stream of lava in the latter extending fully twenty-five miles from the seat of disturbance.

MAURICE (maw'rĭss), prince of Orange and count of Nassau, eminent general, born at Dillenburg, Germany, Nov. 14, 1567; died in The Hague, Holland, April 23, 1625. He was the son of William the Silent, and, after his father was assassinated, in 1534, he became governor of Holland and Zealand. Later Utrecht also chose him as stadtholder, and under his leadership the United Provinces expelled the Spaniards. The final victory over the Spaniards was won at Nieuport in 1600, and nine years later the independence of the United Provinces was recognized by Spain. The latter years of his reign were devoted to internal improvements and a strengthening of his claims against the pretensions of the Orange faction. He was succeeded as stadtholder by Frederick Henry.

MAURICE, John Frederick Dennison, British clergyman, born in Normanston, England, Aug. 29, 1805; died April 1, 1872. He descended from a family of Unitarians, studied at Cambridge, and became a contributor of the "Athenæum" at London. In 1837 he joined the Church of England, and the following year was ordained as a priest. His first charge was at Guy's Hospital. He became professor of literature at King's College in 1840, and subsequently served as professor of theology in that institution for seven years. From 1866 until his death he was professor of moral philosophy at Cambridge. Besides being an able minister and educator, he showed deep interest in founding educational institutions and in writing. His productions embrace "Moral and Mental Philosophy;" "Kingdom of Christ;" "Prophets and Kings of the Old Testament;" "Social Morality;" "Religions of the World," and "Doctrine of Sacrifice."

MAURICE, duke and elector of Saxony, born in Freiberg, Germany, March 21, 1521; died at Sievershausen, near Lüneburg, July 11, 1553. He was the son of Duke Henry the Pious and received a liberal education as a Protestant. In 1541 he married Agnes, daughter of the landgrave Philip of Hesse, and succeeded his father as duke of Saxony the same year. The next year he secured the favor of Charles V. by assisting him against the Turks and French, and was made elector of Saxony in 1546 for aiding in the defeat of the League of Schmalkald. However, Charles V. proceeded to persecute some of the Protestant princes, a fact that estranged Maurice, being himself a Protestant. Accordingly Maurice concluded a treaty with Henry II of France in 1551, and formed an alliance with several German princes. In 1552 John Frederick and Philip

of Hesse, whom Charles held captive, were released and the treaty of Passau was concluded, thus giving Maurice decided advantages in the establishment of religious liberty for the Protestants. Subsequently Maurice maintained his authority against the Turks and Hungarians. In 1553 he formed an alliance against Margrave Albert of Brandenburg, who refused to recognize the treaty of Passau. The latter was defeated in a decisive battle at Sievershausen on July 9, 1553, but Maurice was mortally wounded and died soon after.

MAURICIUS (maw-rĭsh'ĭ-us), **Flavuis Tiberius,** Byzantine emperor, born in Cappadocia about 539 A. D.; executed Nov. 27, 602. In 578 Tiberius appointed him to command the army against the Persians, in which capacity he established strict discipline and attained universal respect, and in 581 defeated the Persians in a decisive battle at Constantinople. He married the daughter of Emperor Tiberius, and at the death of that sovereign, in 582, succeeded him to the throne. In 602 his army revolted because the emperor refused to ransom 12,000 veterans. Phocas was elected to the throne soon after, and Mauricius was executed. He encouraged commerce and institutions of learning, and was the author of a treatise on military discipline, a work which is still extant.

MAURITANIA, anciently the name of that portion of northwestern Africa which corresponds to the area included in Morocco and the western portion of Algeria. It extended south to the Sahara Desert, and was separated from Numidia on the east by the Mulucha River, now called the Muluya. The Romans made it a province in the year 40 A. D.; the Vandals controlled it from 429 to 534, and in 650 it became an Arabian possession. Mauritania was so named from its early inhabitants, the Mauri, a tribe of Moors closely allied to the Numidians.

MAURITIUS (ma-rĭsh'ĭ-ŭs), or **Isle of France,** an island in the Indian Ocean, 500 miles east of Madagascar. It has an area of 705 square miles and a population of 380,790, and is a crown colony of Great Britain. Connected with it are several adjacent islands, the principal ones of which include Rodriguez Island, the Almirante, Oil, Seychelles, and St. Brandon islands. These additional islands have an area of 350 square miles and a population of 17,500. Mauritius is of volcanic origin. It has coral reefs and contains a number of mountains. Its surface rises gradually from the coast, culminating in its highest peak, Riviere Noire, 2,710 feet above sea-level. Much of the soil is a rich vegetable mold, formerly bearing heavy forests, but now utilized largely in agriculture. Sugar is the principal product, but there are also considerable interests in cotton, live-stock, rice, maize, coffee, and many varieties of fruit.

Schools are maintained by government grants and taxation, and there are several higher institutions of learning. The language is principally French and the religion largely Roman Catholic, but various missionary stations are maintained by Protestants. Climatic conditions are favorable to vegetable growth, but hurricanes are not uncommon. The population consists largely of settlers from the East Indies, and about one-third are descendants from the French. There are imports of flour, grain, clothing, and machinery; and exports of sugar, fiber, vanilla, aloes, and fruits. Mauritius was discovered in 1505 by the Portuguese, who found it uninhabited. In 1598 it was occupied by the Dutch, and abandoned by them in 1710. The French introduced the culture of sugar, and in 1810 it became a British possession. There is a local lieutenant-governor and a legislative assembly. The seat of government is at Port Louis, a thriving city.

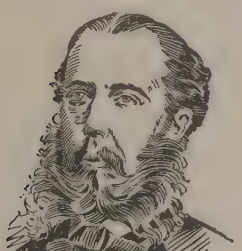
MAURY (mō-re'), **Matthew Fontaine,** naval officer and scientist, born near Fredericksburg, Virginia, Jan. 14, 1806; died Feb. 1, 1873. He entered the navy as midshipman at the age of nineteen, being assigned to the Brandywine, that sailed to France with General Lafayette. In 1826 he was transferred to the Vincennes, and with it circumnavigated the globe during a cruise of four years. He became lieutenant in 1836, and was gazetted to make an exploring expedition, but in 1839 became unfitted for active service by an accident. Soon after he was placed in charge of scientific work at the Washington Observatory, where he rendered valuable services by making observations of currents of wind, publishing from time to time treatises bearing on the results of his researches. At the beginning of the Civil War he joined the Confederate army, attaining to the rank of commodore for efficient services. After the conclusion of the war he traveled through Europe and thence proceeded to Mexico, where he was made commissioner of immigration by Maximilian, but at the death of the latter returned to Virginia and became professor of physics in the military institute at Lexington. Maury added funds of vast value to the knowledge of ocean meteorology, and instituted an international conference at Brussels in 1853. His publications include "Treatise on Navigation;" "Physical Geography of the Sea;" "Great-Circle Sailing," and "Letters on the Amazon and Atlantic Slopes of South America."

MAUSOLEUM (ma-sō-lē'ŭm), a magnificent tomb of more than ordinary size. The most celebrated structure of this character was erected in 352 B. C. at Halicarnassus in memory of king Mausolus of Caria by his widow Artemisia. This structure was regarded the seventh wonder of the world on account of its splendor, and from it the term used to designate fine sepulchers was derived. It is asserted by Pliny that its height was 140 feet.

MAXIM, Hiram S., inventor, born in

Sangerville, Maine, Feb. 5, 1840. His early schooling was limited to the common institutions of his state, but he applied himself with much concern to various inventions. At the age of twenty-four he engaged in machine-shops at Fitchburg, Mass., and later served as draughtsman in New York and Boston. In 1877 he began to plan electrical devices, inventing several electric lamps, a dynamo-electric machine, and in 1883 turned his attention to automatic guns. His first gun was exhibited in 1884, and attracted favorable mention by scientific men. This gun contained a single barrel and was capable of firing 600 shots a minute. It has since been improved and adopted by France, England, and many other countries. He also invented incandescent lamp-carbons, smokeless powder, an electric current regulator, and several search-lights. Among the marks of distinction bestowed upon him are membership in the Legion of Honor by the president of France and the Grand Order Medjidieh by the sultan of Turkey.

MAXIMILIAN, emperor of Mexico, archduke of Austria, born in Vienna, Austria, July 6, 1832; executed July 19, 1867. He was the younger brother of Francis Joseph I. of Austria, received a liberal education in the German universities, and was given special training for the navy. In 1857 he was appointed governor of the Lombard-Venetian kingdom, the duties of which he administered with eminent success, but a civil war caused him to resign two years later. He married Princess Charlotte, daughter of Leopold I., king of Belgium. The complicated affairs of Mexico induced France to seek peace, and accordingly that power called a conference of nobles, which body was to select a monarch. After due deliberation it was decided to offer the crown to Maximilian, who accepted it after some hesitation, and in June, 1864, landed at Vera Cruz to take charge of the Mexican government. The army and clergy extended a hearty welcome, but difficulties soon arose among the different parties; besides, there were abuses that his supporters expected him to sanction.



MAXIMILIAN, EMPEROR OF MEXICO.

The advocates of independence organized a powerful army under Juarez to expel him, but Maximilian was supported by a military force sent to Mexico by Napoleon III. However, this army Napoleon was compelled to withdraw. It was the wish of the French people that Maximilian should accompany their troops and give up the territory, but he could not be induced to regard such a move otherwise than disgraceful. His accomplished wife made heroic but vain appeals for European forces to intervene, but after many disappointments and great grief her reason failed. Maximilian headed an army of 10,000 men at Queretaro, where he was besieged for several weeks by a republican army under Escobedo, and on May 15, 1867, made an attempt to pass the lines of the enemy, but was placed under arrest, having been betrayed previously by General Lopez. A trial followed, which resulted in his execution, together with his generals, Miramon and Mejia. The ministers of foreign countries protested in vain against the execution, since it was not in accordance with civilized warfare. However, Maximilian had issued a proclamation in 1865 by which the punishment of death was announced to all persons who should offer resistance to the government, and on account of it the Mexicans refused to grant him mercy. His remains were conveyed to Vienna, where they were interred in the imperial vault.

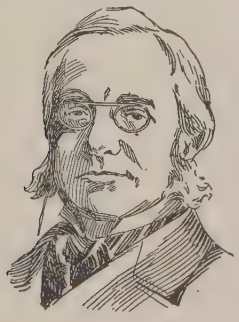
MAXIMILIAN I. (maks-ĭ-mĭl'yan), emperor of Germany, son of Frederick III., born at Neustadt, near Vienna, Austria, March 22, 1459; died Jan. 12, 1519. He married Mary, heiress of Charles the Bold, in 1477, and through her secured Flanders and Burgundy. Soon after he became involved in war with Louis XI. of France, who was ambitious to possess Flanders, and when his wife died, in 1482, he made peace by betrothing his daughter, Margaret, to the dauphin, afterward Charles VIII., and included as her dowry Flanders, Artois, and Burgundy. The Romans chose him king in 1486, and immediately after he began to organize an expedition to expel the Hungarians from Austrian territories on the Danube, which he did in 1490, and two years later defeated the Turks at Villach. In 1493 he secured the provinces ceded to France in 1482, and, on the death of his father, in the same year, became emperor. Subsequently he married Bianca Sforza, daughter of the duke of Milan, by which union he was induced to make an effort to secure possession of a large part of Italy, especially Milan and Naples, but his resources were inadequate to cope with France, and accordingly surrendered his claim of Verona to the Venetians and that of Milan to France. The Swiss Confederation next attracted his attention, and as a result of the peace of Basel in 1499 their territory became practically independ-

MAXIMILIAN I.

ent. However, he secured Tyrol at the death of his cousin, the Archduke Sigismund, and shortly after received a part of Bavaria, Gorz, and other possessions contiguous to them. The marriage of two of his grandchildren with children of the king of Hungary and Bohemia brought those two countries to Austria as hereditary possessions. Maximilian was one of the most celebrated of the Holy Roman emperors, established improved codes of civil laws, founded the universities of Vienna and Ingoldstadt, encouraged commerce and manufacture, and disseminated knowledge in industrial arts. Not only did he have a favorable inclination toward education, but he was himself a man of learning, physical skill, and humane disposition. He is the author of several treatises on gardening, the chase, and military science.

MAXIMILIAN II., emperor of Germany, son and successor of Ferdinand I. of Austria, born in Vienna, Austria, Aug. 1, 1527; died Oct. 12, 1576. He became king of Bohemia and the Romans in 1562, king of Hungary in 1563, and emperor of Germany in 1564. A war was in progress between Turkey and Hungary at the time of his accession and a peace was concluded whereby the sultan, Soliman II., should retain the conquered provinces in Hungary. He tolerated Protestantism, but many of his close advisers were ardent advocates of the Catholic faith, and his influence in the government became limited by Jesuit influences.

MAX-MULLER (maks-mü'lẹr), **Friedrich**, German philologist, born in Dessau, Germany, Dec. 6, 1823; died Oct. 28, 1900. He was a son of the poet Wilhelm Müller, received an education at Leipsic and Berlin, and in 1843 studied Sanskrit at Paris. His education included a liberal knowledge of Persian, Arabic, and comparative philology. The East India Company of England commissioned him in 1847 to edit the "Rig-Veda," a work issued from the press of the University of Oxford. He became professor of modern languages at Oxford in 1854, was made Oriental librarian of the Bodleian Library in 1856, and two years later became fellow of All Soul's College. Subsequently he held other important positions in the higher institutions of England. He was first president at the congress of Orientalists in Stockholm, Sweden, in 1889, and received many distinguished honors from learned societies and sovereigns of many leading countries. He is by common consent classed as the greatest linguist of the 19th century. His writings are among the most important of the latter part of that century, containing very valuable contributions in antiquities, philology, science, and Oriental history. Among his books most extensively read are "Chips from a German Workshop;" "History of Sanskrit Literature;" "Institutes of Vishu;" "Sacred Books of the East;" "Origin and Growth of Religion;" "Psychological Religion;" "Science of Language;" "Sacred Hymns of the Brahmans," and "Natural Religion and Physical Religion."



MAX-MULLER.

MAXWELL (măks'wẹl), **James Clerk**, author and philosopher, born in Edinburgh, Scotland, June 13, 1831; died Nov. 5, 1879. He studied at Edinburgh Academy and Cambridge. His writings include "Matter and Motion;" "Theory of Heat," and "Electricity and Magnetism."

MAXWELL, Mrs. John, novelist, born in London, England, in 1837. Her maiden name was Mary Elizabeth Braddon. She took an interest in literature at an early age, became editor of the "Belgravia," and in 1874 married John Maxwell. Her novels include "Aurora Floyd" and "Ishmael."

MAYNOOTH (mā'nōōth), a village of Ireland, situated in Kildare county, about fifteen miles northwest of Dublin. It is the seat of the famous St. Patrick's Roman Catholic College, an institution established in 1795 by the Irish parliament for the education of priests. It was supported by government grants, and when Ireland was united with Britain the endowments were maintained until 1869. Improvements were made in 1890 by expending $250,000. The institution has well planned courses of study and is attended by about 600 students.

MAYSVILLE, a city in Kentucky, county seat of Mason county, on the Ohio River, sixty miles northeast of Lexington. It is the seat of several educational institutions, has paved streets, electric lights, several fine schools, and numerous railway connections. The manufactures embrace furniture, cotton goods, spirituous liquors, flour, tobacco, and lumber products. It has a growing trade in farm produce and merchandise. Population, 1900, 6,423.

MAYWEED, a disagreeably strong-scented weed of the aster family, also called dog-fennel, stinking chamomile, and dilweed. It is an annual plant, has finely dissected leaves, solitary terminal flowers with yellow disc and white rim, and grows particularly along roadsides, paths trodden by cattle, and in pastures. The plant is a native of Europe, but has been naturalized throughout the cultivated regions of the United States. It is easily exterminated by cultivation, but, if left undisturbed, it spreads rapidly.

MAZARIN (măz-a-reen'), **Jules**, cardinal and statesman, born at Piscina, Italy, July 14, 1602; died in Vincennes, France, March 9, 1661. He was taken to Rome at an early

age for a course of training under the Jesuits, and in his seventeenth year pursued advanced studies at Alcala, Spain. In 1624 he became captain of infantry in the pope's army, and in 1629 was entrusted by Pope Urban VIII. with the management of the war of the Mantuan succession. Shortly after he accompanied a legate sent by the pope to the court of France, where he met Richelieu, by whom he was offered important service for the king of France, which he accepted, and in 1639 became a naturalized Frenchman. In 1641 he was rewarded for important services in winning over the princess of France to the king by being promoted to the rank of cardinal. When Richelieu died the following year, Mazarin succeeded him as supreme minister. In that position he showed himself a man of marked natural ability and acquired skill in discharging the duties of that important office. Mazarin had an inherited desire to humiliate the house of Austria, for which purpose he formed alliances with Sweden and the Netherlands, and also operated to establish the French frontier at the Rhine. Thinking that a Spanish princess would unite the Spanish Netherlands as a dowry to Louis XIV., he became implicated in a policy that roused opposition in the United Provinces, and the peace treaty of Westphalia in 1648 did not strengthen him. Soon after the Fronde wars arose, during which his policy, like that of Richelieu, was to weaken the nobles and limit feudal ownership of land. This course against the nobility and excessive taxation necessitated his exile for a number of years, but in 1653 he was permitted to return to Paris, where he was reinstated in his former position with much enthusiasm. Decisive policies as to internal organization and foreign commerce brought him back to his former popularity, and France became more powerful both at home and abroad. Among the advantages attained may be enumerated an alliance with Cromwell, and the marriage of Louis XIV. with the Infanta Maria Theresa, a union by which the French dynasty secured claims to succession in Spain. He left a vast fortune at his death. In 1745 his "Letters" were published in Paris.

MAZATLAN (mä-zät-län'), a seaport city of Mexico, located in the state of Sinaloa, near the entrance to the Gulf of California. The city has a fine location, is well built, and conducts a large trade in pearls, dye-stuffs, minerals, and earthenware. Its harbor is one of the most important in Mexico. Population, 16,430.

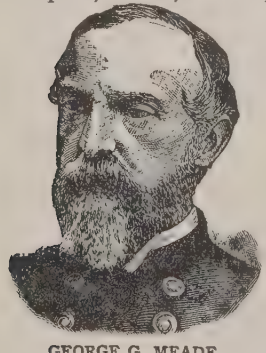
MAZEPPA (mä-zĕp'ä), **Ivan Stephanovitch**, Polish military officer, born in Podolia, Poland, in 1645; died Sept. 22, 1709. He descended from a noble family, and became page for the Polish king, John Casimir. While a youth he was implicated in a family matter and as punishment was bound to the back of an untamed horse. The animal passed through the native woods until at last it reached its former haunts, but was captured by peasants, who released him. Subsequently he joined the Cossacks, who selected him as their chief because of distinguished courage and bravery. Peter the Great was attracted by Mazeppa's skill, and soon after created him prince of Ukraine. In this official position he became touched by the oppression placed by the Russian Czar upon the Cossacks, and for the purpose of reforms concluded a conspiracy with the king of Sweden, Charles XII. When his treason became known to Peter the Great, Mazeppa joined Charles XII. and rendered assistance in the battle of Pultowa. His army being defeated, he was compelled to flee with Charles XII. to Bender, Turkey, in 1709, and died the same year. Lord Byron made Mazeppa the hero of one of his best known poems.

MAZZINI (mät-see'nee), **Giuseppe**, revolutionist, born in Genoa, Italy, June 28, 1805; died in Pisa, March 10, 1872. He descended from a family in good standing, entered the University of Genoa in 1818, and in 1826 graduated from the law department. About that time he became interested in literature and contributed to various journals, besides writing a number of essays, among them "Dante's Love of Country." The government suppressed several of the political papers to which he contributed on account of his liberality. In 1830 he joined the secret society of the Carbonari, an organization disseminating the doctrines of independence. He was imprisoned for a year because of being an active member, but after his release became the more active, on account of which he was exiled to Marseilles in 1832. Shortly after the French government ordered him from the country, when he settled in Switzerland, and there planned a number of revolutionary movements, but was expelled from the Swiss Confederation in 1837, when he proceeded to London. His activity was ceaseless and well directed. Several concerted organizations were formed in various countries, even though he had to support himself by conducting night schools, but in 1844 the English authorities interfered with his mail by sending a number of letters to Italian officials. In the Revolution of 1848 Mazzini was an active participant. He operated at first in Lombardy, then proceeded to Tuscany, operating everywhere in full accord with Garibaldi, and when the pope was compelled to flee, in 1849, he became president of the new republic, on March 29 of that year. The army of France appeared before Rome on April 25, and after a heroic defense Mazzini was compelled to surrender. In 1860 he coöperated with Garibaldi in the successful Sicilian expedition, and in 1864 returned to England, where he continued his active support of the Garibaldi party by writing and publications. In 1868 he became dangerously ill, but recov-

ered sufficiently to take an active part in a republican rising in Italy. He was arrested at Gaeta and kept a prisoner at Rome until liberated by the Italian army. Mazzini was a man of extraordinary eloquence and influence, personally frugal and unselfish, and a powerful force in making it possible to finally overcome the power of the pope in governing both the church and the state, and also furthering the cause of popular government. Both Garibaldi and Cavour were successful chiefly because of the work commenced and prosecuted by Mazzini.

MEAD, Larkin Goldsmith, sculptor, born in Chesterfield, New Hampshire, Jan. 3, 1835. He settled at Brattleboro, Vermont, when quite young, securing his education in that city. Later he studied art in Brooklyn, New York, and in Italy, where his natural ability was shaped into artistic skill. His productions embrace "Recording Angel," a statue entitled "Vermont," now over the dome of the Montpelier capitol; "Columbus Before Isabella," and "The Returned Soldier." In 1862 he prepared a model for a statue of Lincoln, which he brought from Florence, Italy, and from it prepared the beautiful sculpture now at the Lincoln monument, Springfield, Illinois. His productions include various groups and figures prepared especially for different states and countries.

MEADE, George Gordon, general, born in Cadiz, Spain, Dec. 30, 1815; died in Philadelphia, Penn., Nov. 6, 1872. His birth occurred at the time his father was naval agent for the United States in Spain. He graduated with honors at West Point in 1835, took part in the campaigns against the Seminole Indians, and soon after became civil engineer. In 1842 he again entered the army. He served with distinction on the staffs of Taylor and Scott in the Mexican War, attaining particular successes at Palo Alto and Monterey. After the Mexican War he engaged as constructor of lighthouses and surveyor of the Great Lakes, and at the beginning of the Civil War became commander of a Pennsylvania brigade of volunteers. He commanded in the Seven Days' battles, was severely wounded at Glendale, and distinguished himself in the Antietam campaign and the battle of Fredericksburg. At Chancellorsville he had command of a corps and at the resignation of Hooker succeeded to the command of the army of the Potomac. Almost immediately after occurred the battle of Gettysburg, on July 1-3, 1863, and for the skill and valor demonstrated he received the thanks of congress. In 1864 he remained in command of the army of the Potomac, while General Grant assumed general command, the two warriors remaining close friends during the entire contest. In May of that year occurred the battle of the Wilderness, and the event of the war closed with Lee's surrender. During the entire time Meade commanded with such efficiency that in August he was promoted to the rank of major-general. He was made commander of the military division of the Atlantic in 1865; the following year he became commander of the department of the east, and subsequently of the military district including Alabama, Florida, and Georgia. Citizens grateful for his services to the country subscribed a handsome fund with which they purchased a beautiful home for him in Philadelphia, where his death occurred.



GEORGE G. MEADE.

MEADOW LARK, a bird of North America, and common in the United States as far south as the Mexican boundary. It

MEADOW LARK.

belongs to the oriole family, migrates to the northern states in the spring, and is valuable as a destroyer of insects. Its song is sweet and plaintive; the feathers brownish with reddish at the end, and in some localities it is sought for food. The common species is ten inches long; the bill is nearly two inches, and the extended wings are fifteen inches. It is allied to the starlings.

MEADVILLE, a city in Pennsylvania, county seat of Crawford county, and noted as a railroad and manufacturing center. The surrounding country is agricultural and dairying, and contains deposits of natural gas, oil, and coal. There are manufactures of lumber products, flour, machinery, hardware, leather belting, and utensils. It has a good public school system, and is the seat of a number of higher institutions of learning, including Alleghany College, a Methodist institution with 350 students and a library of 15,000 volumes. The municipal facilities

include pavements, electric lights, waterworks, and street railways. Population, 1900, 10,291.

MEASLES (mē'zl'z), an infectious disease occurring most frequently among children, and seldom more than once in the same individual. The rash appears about eight days after exposure, is accompanied by sneezing, watery eyes, watery discharge from the nose, and frequently with pain in the forehead. The greatest danger occurs from affection of the bronchi, and a relapse following exposure to cold at the time of affection or immediately after. Crescent-shaped spots of red appear, occurring first on the face and later passing downward, and disappear in the same order. Measles occurs most frequently in the colder seasons of the year. It rarely affects children under the age of five months, and is not particularly dangerous in the young unless exposed to cold. In old age it is much more dangerous and death from its effect is not infrequent. A form of disease known as rötheln or German measles is often mistaken for scarlatina and measles, but differs from them. The eruptions in rötheln last longer, usually from four to ten days. It is a very mild disease, requiring only liquid food and laxative treatment and keeping in bed a number of days.

MEASURE, the extent, volume, quantity, capacity or dimensions of anything as ascertained by a certain rule or standard. Standards of measurement are fixed by law or custom. They are recognized by all the civilized countries, but differ materially in the various governments. Below are the principal measurements used in the United States for determining extent and volume:

LINEAL MEASURE.

12 inches	make	1 foot
3 feet	"	1 yard
5½ yards, or 16½ feet	"	1 rod
4 rods	"	1 chain
10 chains, or 40 rods	"	1 furlong
8 furlongs, 5,280 feet	"	1 mile

SQUARE MEASURE.

144 square inches	make	1 square foot
9 square feet	"	1 square yard
30¼ square yards	"	1 square rod
16 square rods	"	1 square chain
10 square chains	"	1 acre
640 acres	"	1 square mile

SURVEYORS' MEASURE.

7.92 inches	make	1 link
100 links, or 22 yards	"	1 chain
80 chains	"	1 statute mile
69.121 miles	"	1 geographical degree

CUBIC MEASURE.

1,728 cubic inches	make	1 cubic foot
27 cubic feet	"	1 cubic yard
231 cubic inches	"	1 standard gallon
2,150.42 cubic inches	"	1 standard bushel
50 cubic feet round timber	"	1 ton
40 cubic feet hewn timber	"	1 ton
16 cubic feet	"	1 cord foot
24¾ cubic feet	"	1 perch of stone
8 cord feet, or 128 cubic feet	"	1 cord of wood
36 bushels, or 57¼ cubic feet	"	1 chaldron

CLOTH MEASURE.

2¼ inches	make	1 nail
4 nails	"	1 quarter
4 quarters	"	1 yard
3 quarters	"	1 ell Flemish
5 quarters	"	1 ell English
6 quarters	"	1 ell French

MECCA (měk'a), an ancient city of Arabia, capital of the Hedjaz province, and noted as the birthplace of Mohammed. Its location is in a valley about sixty-five miles east of Jiddah, its seaport on the Red Sea, and it is surrounded by hills and sandy plains. The adjacent hills form a natural protection and make it impossible to see the city until near its confines. The architecture is chiefly of brick or stone; the buildings are mostly from three to four stories high, and have windows that open toward the streets. Very little paving has been done, thus leaving the streets dusty in summer and muddy during the rainy season. The only drainage provided is on the surface, though it has several streets that are regular in construction and contain handsome buildings ornamented with paintings. Provisions of all kinds are carried to the city by camels and vehicles, this being necessitated by the barren character of the surrounding country. The size of the city is to be attributed wholly to its being the birthplace of Mohammed, by virtue of which it is the holiest city of the Moslem world, and to it are attracted vast numbers of pilgrims from all parts of the Mohammedan countries.

El-Haram, or the house of God, is situated in the center of the city, in which the Kaaba is kept, and which has been a center of attraction for ages. The Kaaba contains a small meteoric stone, that is securely built into the southeast corner, and forms the Black Stone or fetich. Nineteen gates admit pilgrims into the El-Haram. It has room for 35,000 persons, and in it the pilgrims kiss the Black Stone. There is also the Southern Stone, which has a traditional power when touched, while an inclosure is supposed to contain the remains of Hagar and Ishmael. The interior is decorated elaborately with precious stones, silver and gold, and fine drapery, and the wealthy Moslems journey there annually. Those who are unable to make the journey may send a substitute, defraying his expenses, but at the same time receiving the benefits. Hadji is a term applied to those who make the pilgrimage. There are no large public buildings of any character aside from the El-Haram. The city is also destitute of trees and has no verdure of any kind. It is governed by a sherif under the sultan of the Turkish Empire, and receives annually from 75,000 to 100,000 pilgrims. Mohammed conquered the city in 627 but in 930 it was sacked by the Karmathians, who carried the Black Stone with them and retained it for nearly a quarter of a century. In 1833 Mecca became a possession of the pasha of Egypt, but soon after fell to the Turks. It has manufactures

of embroidery, rare textiles, and medicine. The population is estimated at about 60,000.

MECHANICAL POWERS, the instruments or means by which heavy weights may be sustained or material resistance overcome by a small force. The important mechanical powers, one or more of which are necessary in the construction of machinery, include the wedge, screw, inclined plane, lever, pulley, and the wheel and axle.

MECHANICS (mĕ-kăn'ĭks), the branch of physical science that treats of the phenomena caused by the action of forces on material bodies. That branch of mechanics which investigates the effects of forces not in equilibrium, but producing motion, is termed dynamics. The division that investigates the relation between forces in equilibrium is called statics. Pneumatics is the special branch of hydro-mechanics that treats of gases.

MECHLIN (mĕk'lĭn), or **Malines**, a city of Belgium, located on the Dyle River, in the province of Antwerp, about twelve miles north of Brussels. The city is well built, has fine avenues of trees, extensive gardens, beautiful streets, and is proverbial on account of its cleanliness and beauty. There are manufactures of machinery, woolen fabrics, hats, laces, and various textiles. Important railroad lines connect it with the principal cities of Belgium, thus giving it important trade advantages. Among its public buildings are several splendid cathedrals, public schools, charitable and benevolent institutions, and colleges of industry, art, and science. Many excellent statues adorn the public places. Several of its public parks are beautiful. Its public library is large and valuable. Population, 50,690.

MECKLENBURG DECLARATION (mĕk'lĕn-bûrg), a solemn compact made on May 20, 1775, by a convention at Mecklenburg, North Carolina, in which the people declared their independence of Great Britain. The declaration did not become generally known until 1818, and the original documents were destroyed by fire several years earlier, in 1800. May 20 is a legal holiday in the state of North Carolina because of that day being the anniversary of the Mecklenburg Declaration.

MEDAL, a piece of metal cast in the form of a coin, and stamped with some figure or inscription to commemorate some illustrious person, or some remarkable deed. Medals are usually issued as a reward of merit, and differ from coin in that they are not current as money.

MEDFORD (mĕd'fŏrd), a city of Massachusetts, in Middlesex county, on the Mystic River. It is connected by electric railways with Boston, is an important manufacturing center, and has good railway connections. The manufactures include cotton and woolen goods, carriages, paper, machinery, flour, bicycles, mattresses, earthenware, leather, and spirituous liquors. It has good schools, and contains Tufts College, founded by the Universalists in 1853. This institution was named in honor of Charles Tufts, who donated seventy acres of land. The city also has waterworks, public lighting, and a library of 20,000 volumes. Population, 1900, 18,244.

MEDIA (mē'dĭ-ą), an ancient and powerful country corresponding to the northwestern portion of Persia. Its boundary on the north was formed by the Caspian Sea, south by Persia, east by Parthia, and west by Assyria. The southern portion of that region is fertile and the northern part mountainous. The inhabitants were called Medes. They were of the Aryan race, and in language, religion, and manners were closely allied to the Persians. The Medes were not only skilled horsemen, but excelled in warfare and many of the arts of peace, especially in stock raising and agriculture. Assyria maintained some degree of sovereignty over them until 708 B. C., when they united and established their seat of government at Ecbatana and chose Kai-Kobad as their chief. Shortly after they formed an alliance with Nabopolassar, king of Assyria, and overthrew the Assyrian Empire in 604 B. C. Subsequently they conquered Scythia, much of Asia Minor, and parts of Egypt, but in 585 B. C. they were frightened into peace by an eclipse predicted by Thales. Their king Astyages was deposed in 560 by Cyrus of Persia, and from that time they are known in history as the Medes and Persians, but Cyrus styled himself king of Persia and emphasized his national descent. Cyrus took the treasures from Ecbatana to his own capital, but made it his summer residence, a custom followed by other Persian kings for many years. From the death of Alexander the Great, in 324, till the time of Augustus, Media existed as a separate kingdom, but a portion of it known as Great Media formed a part of the Syrian monarchy. Mithridates I. conquered Great Media and attached it to Parthia in 147 B. C., and in the year 36 B. C. its king was at war with Mark Antony. In the time of the Sassanain dynasty the whole of Media became a part of Persia, to which it has since belonged.

MEDICI (mĕd'e-chee), a family celebrated in the history of the Florentine Republic, and who owed their early distinction to successful and energetic commercial enterprises. Their influence became noteworthy as early as the 13th century, from which time they took a prominent part in the leading events of the republic. Their greatest influence dates from 1378, when Giovanni de Medici rose to a powerful station and at his death, in 1429, left immense wealth and honors to his sons, Cosmo and Lorenzo. In the 15th century the Medici family rose to sovereign power, exercising marked influence upon the classical learning, commercial

enterprises, and civil institutions of Florence and other European countries until in 1743, when the last of the Medici family, Electress Palatine of Tuscany, died.

MEDICI, Lorenzo de, sovereign of Florence, born Jan. 1, 1448; died April 8, 1492. He was the son of Pietro Medici, brother of Giuliano Medici, and received a careful and liberal education. At the death of his father, known as Pietro I., Lorenzo and Giuliano became joint rulers. Their reign aroused opposition among the Florentines, who began in 1778 to plot their overthrow, being encouraged in this by Pope Sixtus IV. While the two were attending high mass at Florence, on April 26, 1478, conspirators fell upon them, in which Giuliano was killed, but Lorenzo succeeded in escaping after a heroic defense against his assailants. Immediately Lorenzo became the sovereign, punished his enemies, and established his government under a rigid system that won the friendship of Innocent VII., successor to Sixtus IV. Having won the support of the pope, he immediately began to encourage art and literature, founded the University of Pisa, introduced printing at Florence, and greatly enlarged the usefulness of the library founded by his grandfather, Cosmo. His government was directed rather to increase the power of the Medici family than to strengthen Florence against foreign opposition, and thus encouraged divisions and parties that finally made Florence an easier prey to ambitious warriors. Lorenzo was not only a prose writer, but a poet of considerable genius.

MEDICINE (mĕd'ĭ-sĭn), the science directed first to the prevention of diseases, and next to their cure. Medicine as a science investigates the structure and functions of organs of the body; their liability to disease, how disease may be prevented, and the various remedial agents or antidotes that are to be prescribed for the alleviation or removal of disease. In early times diseases were attributed to supernatural forces, and it was alleged that invisible beings would under certain circumstances affect the body and ultimately destroy it by death. Priests at first had charge of the medical and sanitary practice. Even at the present time there are superstitious views held by some of the people of Asia and other parts of the earth. For instance, it is not uncommon to pay from ten to twenty cents for a string to be worn about the neck by children as a preventive against disease, the price depending upon the length of time for which its virtues are guaranteed.

The skill possessed by the Egyptians in embalming their dead is taken as evidence that they knew and taught much in regard to the elements of anatomy. Æsculapius, a famous Grecian who lived before the Trojan War, was one of the most eminent of early physicians, and at his death became deified as the Greek god of medicine. Hippocrates, who lived about 1,000 years later, is known as the founder of Greek medicine. The science of medicine has been considered of importance from remote times by all classes, many savages possessing knowledge of the medicinal virtues of various barks, herbs, and plants, as well as different mineral substances. In modern times medicine has been considered one of the most important of sciences. It has had growing attention since the discovery of the circulation of the blood by Harvey, in 1616.

Many distinguished writers have classified medicines under three divisions: Internal remedies, such as are administered for their effect upon the system, both before and after absorption into the blood; external remedies, designed to act locally and not intended to affect the general constitution; and chemical agents, used for other than their medical properties. To administer the different remedies it is necessary to have a liberal knowledge of physiology, anatomy, hygiene, pathology, chemistry, and various allied subjects. The departments of medicine now commonly recognized include surgery, which relates to injuries and ailments visibly affecting the body; medicine proper, that department which belongs to the physician and embraces the care and administration of medicine in various forms of diseases, and midwifery, the branch embracing diseases peculiar to women, child-bearing, and diseases of infants. Besides these are special fields for study, such as pertain to the general study of the dentist, eye and ear doctor, and those giving particular attention to special diseases. Hygiene is the science of health; pathology, the science of disease, and nosology, the science which investigates the origin and symptoms of various diseases and aims at their proper classification. Therapeutics includes the treatment of general and special diseases, together with their character and the effects of remedial agents on the human organization, both in health and disease. Pharmacy involves a knowledge of the preservation of drugs and mixtures of medicines; materia medica embraces the whole science of medicine; and clinics embraces the teaching of medicine and surgery practically in the presence of patients. The science dealing with the care of women during pregnancy is termed obstetrics, and the mechanical alternations of structure, such as are employed in cases of deformity or abnormal conditions, are treated in the science known as pathological anatomy.

There are many medical associations in the United States whose object is to promote professional fellowship, compare theories and modes of medical practice, and study measures by which the science and art of medicine may be improved and elevated. A majority of these associations belong to the allopathic school, but there are large associations of the homœopathic,

eclectic, osteopathic, and other schools of medicine and treatment. The first society organized was the New Jersey State Medical Association, in 1766, and the chief national organization is the American Medical Association, organized in New York in 1846. At present the number of medical colleges in the United States is 150. They have an annual attendance of about 15,500 students; those graduating each year aggregate fully one-third of the number enrolled. These colleges are largely private enterprises, though there are some supported by public grants, and one-third are open alike to both sexes, while ten are exclusively for women. Admission to practice medicine is regulated by the laws of the several states, and the tendency is to elevate the practice by requiring a continuous improvement of courses and thorough preparation before admitting applicants to the practice.

MEDILL (mĕ-dĭl′), **Joseph,** journalist, born in New Brunswick, Canada, April 6, 1823; died in San Antonio, Texas, March 16, 1899. He removed with his parents to Massillon, Ohio, at the age of eight years, studied law at Canton, and in 1848 was admitted to the bar. In 1849 he founded a free-soil newspaper at Coshocton, Ohio, and two years later established the "Cleveland Forest City." Subsequently he secured an interest in the "Chicago Tribune," of which he became chief editor, and in it advocated anti-slavery doctrine. He supported the republican party and its nominees for president, was appointed a civil service commissioner by President Grant in 1871, and was elected mayor of Chicago in 1872. Two years later he became editor and principal owner of the "Chicago Tribune," a periodical he published until his death.

MEDINA (mẹ-dī′nạ), a city situated about 270 miles north of Mecca, Arabia, and regarded by the Moslem world as next holy to Mecca. The city is accorded this distinction for the reason that it was Mohammed's home while exiled from Mecca. It is fortified by a wall from thirty to forty feet high, having thirty towers, and a strong Turkish garrison. The surrounding country is one of the most fertile regions of Hejaz, and the people pursue agriculture and stock raising. A mosque is located on the place where it is thought that Mohammed died, and in it visitors are shown the sacred tomb within a screen of iron filigree. The coffin is reputed one of much value, being cased with silver, ornamented with precious gems, and in it the body of Mohammed is believed to lie in a well preserved state. It is said that Europeans have never seen the coffin, but that it is the burial place of the prophet is reasonably certain. In 892 the mosque was rebuilt, having been destroyed previously by lightning. Many of the fabulous treasures that formerly marked the burial place have long since disappeared. In the 7th century Medina was the capital of Islam. It became famed for its institutions of learning, and still possesses schools endowed by public grants. There are many gardens, fountains, orchards, and a number of excellent buildings in the city. The population is about 16,500.

MEDITERRANEAN SEA, the great inland sea lying between Eurasia and Africa, and constituting the largest enclosed body of water in the world. Its length from east to west is 2,275 miles, general breadth from seventy-five to 500 miles, but its greatest width in the Adriatic extension is fully 1,075 miles. The strait of Gibraltar is its only connection with the Atlantic Ocean, from which it extends eastward to Arabia, and is connected with the Red Sea and the Indian Ocean by the Suez Canal. Among its important inlets are the Adriatic Sea, Ægean Sea, Gulf of Sidra, and Gulf of Cadres. It is connected with the Black Sea by the Dardanelles Strait, Sea of Marmora, and Bosporus Strait. Numerous islands abound, the most important being Sardinia, Corsica, Sicily, Crete, Cyprus, Malta, the Ionian Isles, the Balearic Isles, and Rhodes. Many important rivers discharge their waters into the Mediterranean, among them the Nile, Ebro, Rhone, and Po, but the evaporation is in excess of the natural inflow, and if it were not for connection with the Atlantic Ocean its water would become more densely laden with salt, and finally shrink into at least two smaller bodies; the division line would come somewhere between Italy and Tunis. On its shores and some of the islands are the most famous volcanoes in the world, including Stromboli, Vesuvius, and Ætna. Destructive earthquakes have occurred at various times. The general depth is from thirty to 2,125 fathoms. Fine corals, sponges, and fin fish abound in great quantities, while as a highway for traffic it is of vast importance. Many of the countries bordering on the Mediterranean have been prominent in the history and civilization of the world, among them Egypt, Greece, Italy, Asia Minor, and Palestine.

MEDULLA OBLONGATA (mĕ-dŭl′là ŏb-lŏn̲-gā′tà). See **Brain.**

MEDUSA (mĕ-dū′sà), in mythology, one of the three daughters of Phorcys and Ceto, who were the personification of those benumbing sensations which result from sudden and extreme fear. Medusa was the most celebrated of the three sisters, and alone possessed mortality. Having taken a vow to devote her life to celibacy, she married Poseidon, and for violating this vow was horribly punished by being made to appear most loathsome, and accordingly fled from home never to return. Medusa is represented in art as a restless being, possessed of brazen claws, tusk-like teeth, and hissing serpents dropping from her hair. She was related to the giant Geryones, who was slain by Hercules, and was herself killed by Per-

seus while guarding the garden of the Hesperides.

MEERSCHAUM (mēr'shăm), a compact, massive mineral with fine earthy texture, composed of 60.8 parts silica, 27.1 magnesia, and 12.1 water. When dry it floats on water It was first discovered by a German who named it meerschaum, meaning seafoam, and was thought to be solidified froth made by the waves. It is found as a mineral in South Carolina. but particularly in Asia Minor, Spain, Moravia, Greece, and Turkey. Meerschaum is used principally in the manufacture of tobacco pipes, and the best products represent much value. Cheaper grades of pipes are made from waste material, which is ground and held together by a paste.

MEGAPHONE (mĕg'ȧ-fōn), a kind of telephone invented by Thomas A. Edison in 1878, and by which it is possible to hear a whisper fully 1,000 feet. At one end is a tube to fit the ear, while the other end has a pair of large funnels, which are so placed that the sound waves produced by a speaker are caught up and conducted to the listener at the other end. By means of the megaphone it is possible for persons with impaired hearing to get the benefits of a speaker, and it is also an easy matter to carry on a conversation at a distance of several miles, in which case it is necessary to use two megaphones.

MEGATHERIUM (mĕg-ȧ-thē'rĭ-ŭm), a genus of extinct edentates, and of which the remains have been found in the Upper Pampas deposits near Buenos Ayres and other parts of South America. These animals were mammals, had feet adapted for walking on the ground, and were allied to the sloths. In 1832 the skeleton remains of an animal of this class were found about nine miles from Buenos Ayres, which in a mounted condition give evidence that the animal was eight feet tall, and the body eighteen feet in length. Its tail was six feet long. These animals lived on vegetables, which is evidenced by the size of their teeth, and also by the fore feet being adapted for scratching roots out of the ground.

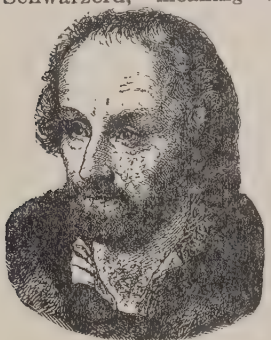
MEHEMET ALI (mā'hẹh-met ä'lee), viceroy of Egypt, born at Kavala, Macedonia, in 1769; died Aug. 2, 1849. He enlisted in the Turkish army when still young, operated against the French in 1799, and in recognition of fine military qualities was made commander of the Egyptian army. The Turkish porte recognized him viceroy of Egypt in 1806, and, after disputes with the Mamelukes, who had ruled Egypt for many years, he caused 470 of their number to be massacred at Cairo in 1811. A remnant of the Mamelukes escaped to Nubia, but these he utterly exterminated in 1820. Subsequently he operated against a religious sect of Arabia known as the Wahabees, and with the aid of his son, Ibrahim Pasha, secured the annexation of Hejaz to his dominion. Later he conquered Cordofan, opened a large slave trade from Central Africa, and began to organize his army according to European discipline. His industry also led to the building of many fortresses, arsenals, a fleet, and the encouragement of industrial arts. In 1827 he fought with the sultan to reduce Morea, but his fleet was destroyed entirely at Navarino by the allied powers of Europe. A dispute now arose with the sultan as to indemnity, on account of which he was given the government of Candia, but this did not satisfy him, and he started on a conquest of Syria. His success was so remarkable that by 1832 he had almost ruined the Turkish government, and in 1839 the European powers interfered and required him to give up Syria, but he was given the pashalic of Egypt as a hereditary right in his family. It may be said that Mehemet regenerated Egypt to a large extent by introducing the cultivation of silk, founding mulberry plantations, and putting the cotton, sugar, and indigo industries upon a firm basis. He also established a system of national education in Egypt, and in 1848 resigned in favor of his son, Ibrahim Pasha.

MEISSONIER (mă-so-ne-ā'), **Jean Louis Ernest**, painter, born in Lyons, France, Feb. 21, 1815; died in Paris, Jan. 31, 1891. He was the son of a pharmacist, studied art as a profession in Paris, but later took additional training in Rome and Switzerland. In 1834 he exhibited a number of productions, mostly book illustrations, and in 1838 prepared illustrations for "Paul and Virginia," attaining by them a favorable reputation. His paintings are elaborate in finish, perfect in local coloring, and are characterized by an execution that always impresses the observer to admire. A famous picture of Napoleon sold for $60,000, and another of later finish was bought in Paris for $100,000. There are about 400 of his paintings in existence, sixty of which are owned by people in the United States, and all have considerable value. In 1867 he was made commander of the Legion of Honor, became a member of the institute in 1861, and was granted distinguished honors at exhibitions and by the sovereigns of the various countries. His best known productions include "Napoleon III. at Solferino;" "La Rixe;" "Smoker;" "Cavalry Charge;" "Friedland," and the two of Napoleon known respectively as 1807 and 1814.

MEKONG (mā-kŏng'), one of the largest and most important rivers in southern Asia. Its source is on the northern slope of the Himalaya Mountains, thence it flows nearly east, and after a bold turn has a southeasterly course, flowing into the China Sea by a delta. The entire length is estimated at 1,750 miles. It courses through a fertile region, has many rapids, and is remarkable for the swiftness of its current.

MELANCHTHON (mẹ-lăn̲k'thọn), **Philipp**, religious reformer, born at Bretten,

Germany, Feb. 16, 1497; died in Wittenberg, April 19, 1560. Originally his name was Schwarzerd, meaning black earth, and this he changed to Melanchthon, its Greek equivalent. His education was secured at the University of Heidelberg, where he graduated in 1512, and secured a master's degree two years later at Tübingen. At the latter city he studied theology, where he also lectured on the philosophy of Aristotle, and soon after published a grammar of the Greek language. The elector of Saxony appointed him professor of Greek at the University of Wittenberg in 1518, where he gave the education of Germany a new impetus, and also formed the acquaintance and close friendship of Martin Luther. When the Reformation was making rapid progress, he became touched with the spirit of reform and threw himself with some degree of caution but intense earnestness into the movement. In 1517 he coöperated with Luther in translating the Scriptures, and, while Luther was confined at Wartburg, he was the virtual head of the Reformation at the University. He published the first treatise on Protestant theology in 1821, a work that went through many editions even in his lifetime, and has since been regarded one of the most noted productions of early Protestantism. In 1530 he occupied the position of leader at the diet of Augsburg, and shortly after published his "Apology for the Augsburg Confession." He is the accredited author of the "Confession," which was adopted under his advice and met the approval of the German princes. Melanchthon was a teacher of more than ordinary force, attracting students from all parts of Europe, and both in habit and practice was a theologian and scholar. As a writer he was prolific. He prepared a large number of official documents, ethical and doctrinal works, commentaries on the Bible, various commentaries on classics and the Septuagint, and many other productions that have come down to the present time and are still consulted in all parts of the civilized world.



PHILIPP MELANCHTHON.

MELBOURNE (měl'bûrn), an important city of Australia, capital of the colony of Victoria, on the Yarra River, and at the northern end of Port Philip Bay. It has a fine location on the undulating regions near the river. Its streets are regularly platted. They are improved by pavements, waterworks, public parks, electric lights, and street railways. It contains many excellent buildings. The public structures include a royal mint, the houses of parliament, the treasury, courts of public justice, excellent school buildings, several colleges, and a university. In the city are many fine churches, numerous scientific and educational associations, and a splendid botanical garden. Its central location on a number of railroads, and its extensive harbor provide ample import and export facilities. There are manufactures of leather, cotton and woolen goods, flour, machinery, furniture, cigars, lumber products, and utensils. The city was founded in 1836, incorporated in 1842, and in 1888 was the seat of a noted exhibition held to commemorate the founding of the first Australian colony in 1788. Population, 492,350.

MELBOURNE, William Lamb, statesman, born in London, England, in 1779; died Nov. 24, 1848. He received a liberal education at Cambridge and Glasgow, was called to the bar, and in 1805 became a member of the house of commons. In 1828 he succeeded his father to the house of lords, became home secretary in 1830, and in 1834 was made premier. He was chosen, in 1837, to instruct Queen Victoria in the various duties of her high office. His administration was succeeded by that of Sir Robert Peel in 1841.

MELCHIZEDEK (mel-chĭz'e-dĕk), a person mentioned in the Scriptures as a priest and called king of Salem, that term being the accepted poetical name for Jerusalem. It is related that he met Abraham when returning from an expedition, giving him bread and wine and blessing him in the name of the supreme God. Abraham thereupon delivered to him a tenth of the goods conquered in battle. Melchizedek is mentioned in one of the Psalms (cx, 4) as a priest. He is referred to in the Epistle to the Hebrews as a type of Jesus.

MELEGNANO (mā-lĕn-yä'nō), a town of northern Italy, formerly called Marignano. It is situated about ten miles southeast of Milan. Its population is 5,385. The town is celebrated in history as the seat of an important battle, in 1515, when Francis I. of France defeated the Swiss troops under the duke of Milan in a decisive battle. Another victory was gained at the same place by the French with a force of 16,000 men on June 8, 1859, defeating the Austrians with a loss of 1,400 men. The first named battle is called the battle of the giants, and in it 20,000 men were slain.

MELODEON (mĕ-lō'dē-ŭn), a wind instrument resembling a piano in appearance, but constructed so that music is produced by means of bellows and reeds. The principle employed is the same as that of the accordion, pressure on the key driving down the pin and the valve, thus allowing passage to the air. The cabinet organ has generally superseded the melodeon, to which it is quite similar.

MELODRAMA (měl-ō-drä'mȧ), a term now used to designate a play of strong situa-

tions, resembling the sensational drama, and rather bold in color than artistic in finish. At various passages thrilling music is introduced to enliven the spectators. This class of drama is used most frequently in second-class theaters, in which sentiment is exaggerated and the situations presented markedly striking.

MELON (mĕl′ŭn), a favorite annual fruit plant cultivated extensively in the temperate zone. It is thought to be native to the Kalmuck country in Tartary, but its present great variety of species and valuable qualities are due to cultivation and scientific propagation. It is known that melons were cultivated by the early Egyptians. They were mentioned by Theophrastus, Hippocrates, Pliny, and other Greek writers. The melon is herbaceous, has a climbing or trailing vine, and bears most successfully in a sandy loam. Both the muskmelon and watermelon are cultivated to be eaten fresh and for preserves. The watermelon is especially a favorite of warmer countries, where it is prized for its refreshing juice. Melon culture is very extensive in the United States, large quantities being transported from the southern regions annually to the city and northern markets. However, the watermelon is produced more generally than the muskmelon.

WATERMELON.

MELOS, formerly called Milos, or Milo, an island in the Grecian Archipelago, situated southeast of the Gulf of Ægina, and belonging to the Cyclades. It is famous in Grecian history. The island has an area of sixty-four square miles, and a population of 3,535. The statue known as the Venus of Milo was discovered on the island in 1820 and is now in the Louvre at Paris. Melos was rich and populous in ancient times, but was devastated by the Peloponnesian War.

MELROSE (mĕl-rōz′), a town of Middlesex county, Massachusetts, about nine miles north of Boston, of which it is a suburb. It has good railway connections, municipal improvements, excellent schools, and a library of 15,000 volumes. It has electric lights, pavements, and street railways. There are important manufactures of sewing-machine needles, boots and shoes, silver polish, rubber goods, and machinery. Population, 1900, 12,962.

MELVILLE (mĕl′vĭl), **George Wallace**, naval engineer, born in New York City, Jan. 10, 1841. He entered the navy after securing an education in New York City, and from midshipman, a rank he held in 1861, he passed successively to the higher ranks until in 1887 he was made commodore. His service in the Civil War was efficient, taking part in many hazardous engagements, and subsequently became naval engineer. In 1879 he visited the Arctic seas in an exploring expedition under George W. De Long in the Jeannette, and, after that vessel sunk in 1881, he commanded a division of the party that sailed in boats. In September of the same year his party reached the mouth of the Lena River, in Asia, and later he discovered the remains of De Long and those of his eleven companions. Melville contributed largely to the building of the United States navy by designing triple-screw machinery. He invented an extended smokestack by which to increase the speed of vessels. He is the author of "Delta," a work containing a history of the Jeannette and the Arctic expedition.

MEMBRANE (mĕm′brān), a thin and wide expansion of any tissue of the body, and divided by anatomists into serous, mucous, and fibrous membranes. Serous membrane covers the joints of bones and the delicate internal organs, like the heart, their purpose being to prevent friction. Mucous membrane lines the internal passages, such as the throat, mouth, stomach, bowels, nose, and others, and may be seen at the lips, nasal passages, and eyelids. The function of the fibrous membrane is to strengthen articulations between tissues and membraneous formations. Fluids are secreted whereby the membranes are kept moist, thus facilitating articulated motion. They also serve to strengthen muscles, tendons, and the various organs. Those surrounding the brain are among the most important, and are called the dura mater, arachnoid, pia mater, and falx.

MEMNON (mĕm′nŏn), in Greek mythology, a hero of the Trojan War, who was slain by Achilles. He was an Ethiopian, the son of Aurora, and came as an ally of the Trojans to aid them by a powerful reënforcement of Negroes. His band of warriors rushed into a center of combatants, when he slew Antilochus, but was mortally wounded immediately after by Achilles. Later his name became associated with one of two statues in Egypt, which, on account of its size, was regarded one of the seven wonders of the world. The statue stood about seventy feet high, and at sunrise every morning gave out a peculiar sound, but after the time of Emperor Severus the sound ceased. It is conjectured that the sound was produced by a person concealed within a square hole, by striking a stone with a hammer, thus producing a peculiar metallic ring.

MEMORY (mĕm'ō-rỹ), the power which brings before the mind concepts of absent objects as they are or were, and recognizes them. This definition includes reproduction and recognition, and a complete act of memory takes place only when both occur. Frequently former concepts are brought before the mind by reproduction, but they are often not recognized as former concepts, in which case the act of memory is incomplete, as it includes only reproduction. Remembrance is usually regarded a generic term and is used to express any act of memory; while recollection implies an intentional act of memory and is properly specific. Recollection is the power the mind has to recall former concepts, and is defined as voluntary remembrance.

MEMPHIS (mĕm'fĭs), an important river-port and railroad center of Tennessee, county seat of Shelby county, on the Mississippi River. The site is on a series of bluffs that have an elevation of about forty-eight feet above high-water mark. It is well platted, has regular and well improved streets, many fine private and public buildings, and is ornamented by splendid avenues of trees and parks. Its manufactures represent a capital of about $12,500,000, employ a large force of laborers, and produce vast quantities of cotton goods. Other manufactures embrace machinery, cotton-seed oil, furniture, flour, tobacco, lumber products, and farming utensils. The surrounding region is fertile, thus giving the city a large trade in cotton, wool, wheat, corn, and live-stock. The public school system is well organized, and besides it there are a number of private schools, a city hospital, a college for women, several orphan asylums, and a Roman Catholic college. In 1878 the yellow fever epidemic became widespread, but since then extended sanitary reforms have been effected, and Memphis is now a healthful city. It has a vast system of sub-soil drainage, sanitary sewers, substantial paving, electric lights and street railways, and a fine supply of city water. Its extensive connections by railroads and steamboat lines facilitate large commercial enterprises. Memphis dates from 1739, when a settlement was made there by the French. It ranks as the thirty-seventh city of the United States. Population, 1900, 102,320.

MEMPHIS, a celebrated city of Egypt, situated about ten miles south of Cairo, and capital of the old Egyptian empire. It was founded by Menes, the first king of Egypt, on the banks of the Nile, and this first historical king changed the main channel of the river by building embankments to protect the city. It is evident that Memphis was a city of much importance from a very early period, and that in the year 1500 B. C. it contained many excellent public buildings, fortifications, and great temples. Among the places of worship were the temple of Serapis, the temple of Phra, and the temple of Plah. Its trade was expansive through many centuries, and was furthered by water communications with the Mediterranean and the Red Sea. There were also magnificent educational institutions, making it the center of Egyptian learning for nearly ten centuries. In the time of Alexandria's greatest prosperity Memphis was the second city of Egypt, and at the time of the Moslem conquest it still had importance, but was in a state of decline. After its fall and destruction, many of the materials were carried to build up other cities, but there still remain a number of relics of vast interest, among them the great statue of Rameses II., the pyramid of Cheops, and numerous ruins of temples and palaces. All the remains were covered more or less with a sandy soil, but many of them have been excavated. Mitrahenny is a village that now stands on the site of the city. In the Old Testament Memphis is mentioned as Noph and also as Mopha.

MEMPHREMAGOG (mĕm-frē-mā'gŏg), a lake extending from Vermont into Quebec. Its length is about thirty-five miles and width from two to five miles. It contains a number of picturesque islands. There is excellent timber on the islands and in the vicinity of the lake. Its abundance of food fish and beautiful scenery make it a popular summer resort. Mount Oxford is near the lake, and has a height of 3,500 feet above its surface. It discharges by the Magog River, through the St. Francis, into the St. Lawrence.

MENAI STRAIT (mĕn'ī), a channel extending between Wales and the island of Anglesea, and connecting St. George's channel with the southeastern part of the Irish Sea. Its length is fifteen miles and greatest breadth about two miles. It is utilized extensively for navigation. Several substantial bridges cross the strait, of which the most important is the Britannia tubular iron railway bridge built in 1850.

MENASHA, a city in Winnebago county, Wisconsin, seventeen miles north of Oshkosh. It is the focus of several railroads, and has a growing trade in produce and merchandise. Among the manufactures are furniture, paper, farming machinery, cigars, and flour. Its buildings include a number of fine schools and churches. Population, 1900, 5,589.

MENAM (mă-năm'), an important river of Southern Asia, having its source in the Laos country. It flows in a southern direction for 900 miles, and discharges near Bangkok into the Gulf of Siam.

MENDELSSOHN-BARTHOLDY (mĕn'dęls-sōn bar-tŏl'dee), **Felix**, musical composer, born in Hamburg, Germany, Feb. 3, 1809; died at Leipsic, Nov. 4, 1847. His father was an eminent banker and his grandfather, Moses Mendelssohn (1729-86), was famous as a philosopher and author. The family was of Jewish descent, but Felix was brought up in the Lutheran faith, his father's

family having embraced that form of religion. He began the study of music when only eight years of age, played in a concert in Berlin at ten, and at eleven began to compose successfully. In 1824 he appeared at Paris, and later made a tour through Germany, Austria, and Italy, receiving everywhere the plaudits of large audiences. His excellent overture to Shakespeare's "Mid-Summer Night's Dream" appeared in 1825. In it he gave expression to his musical inspiration by a blending of the delicate, fanciful, and grotesque. About that time he formed the warm friendship of Weber, Goethe, and Moscheles, receiving from them enthusiastic recommendations. In 1829 he appeared before the Philharmonic Society of London, and about the same time visited Paris, Vienna, Munich, and Rome. His letters from Italy characterize that country as the home of art. On returning to Germany he established a musical theater at Düsseldorf for the purpose of cultivating high art, and in 1835 took charge of the Gewandhaus concerts at Leipsic. The king of Saxony appointed him musical director in 1841, and shortly after he became musical director at the Academy of Arts in Berlin under appointment by the king of Prussia. Mendelssohn ranks among the most eminent composers of the world. He was also skilled in drawing and as an organist and pianist. His musical works are famous the world over, and are still favorites in many countries of America and Eurasia. Some of his productions not mentioned above are "Isles of Finegal;" "St. Paul;" "Elijah;" "Antigone;" "Songs without Words;" "Œdipus;" "Athalie," and "Christus."

MENDELSSOHN-BARTHOLDY.

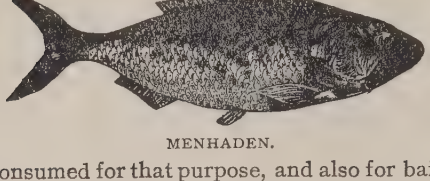
MENDEZ PINTO (měn'dez peen'to), **Fernam**, sailor and philanthropist, born in Portugal about 1510; died near Lisbon, July 8, 1583. He volunteered his services in an expedition against the Turks in 1537, and served on the Mediterranean Sea, Red Sea, and Indian Ocean for twenty-one years. During that time his adventures were greatly varied, being captured twelve times, sold into slavery fifteen times, and as often escaped or was ransomed. In the latter part of his public service he visited the East Indies and Japan, and shortly returned to Ning-Po, China, for the purpose of inducing the Portuguese there to conquer the Japanese Islands. The expedition fitted out was lost, but Mendez returned safely to China, and later served as ambassador to Japan under appointment by the Portuguese governor of India. Besides expending his fortune in founding schools and a Roman Catholic college in Japan, he wrote an interesting autobiography, reciting in it the remarkable adventures of his life and recounting the riches of the East.

MENDICANT ORDERS (měn'dĭ-kănt), a class of Roman Catholic religious associations, which hold to the principle of self-humiliation and religious poverty. They subsist upon alms, basing their tenets upon the words of Jesus expressed in Matthew xix, 21-30, and devote every effort of their life to religious teaching. At present the mendicant orders include the Dominicans, Franciscans, Carmelites, and Augustinians. Members of these orders and also the Friars are forbidden to possess personal property as well as real estate.

MENENDEZ DE AVILES (mā-nĕn'dĕth dă ä-vēe'lĕs), **Pedro**, sailor and explorer, born in Aviles, Spain, in 1519; died in Santander, Sept. 17, 1574. He took early training for the navy, attained the rank of captain-general, and served under Charles V. and Philip II. In 1554 he had command of the fleet that carried Philip to England for the purpose of marrying Queen Mary. Subsequently he became governor-general of the West Indies, and in 1565 sailed with thirty-four ships from Cadiz to establish a colony in Florida. Landing on the Florida coast, he first destroyed the settlement of French Huguenots for the reason that they were Protestants. On Sept. 8 of the same year he founded St. Augustine, the oldest European city in the United States, and shortly after explored South Carolina, Chesapeake Bay, and a portion of the Potomac River. Menendez was extremely cruel in the destruction of Indian villages and Protestant settlements, and consequently was attacked mercilessly by the French and Indians. His settlement at San Mateo was destroyed entirely by French Huguenots while he was in Europe, but on his return, in 1572, he retaliated by attacking the French Huguenots on the northeastern coast, which he also explored with considerable care. In 1573 he was recalled by Philip II. to command a large fleet against the Netherlands and England, but died a day before the fleet was ready to sail.

MENHADEN (měn-hā'd'n), a fish found in abundance off the Atlantic coast of North America, and often called whitefish, hardhead, and bony fish. It is allied to the herrings, but differs from them in having a deep notch in the upper jaw, and is one of the most valuable fish caught in the United States on account of its extensive yield of oil and manures. The length is about thirteen inches, the color is greenish brown, and the body is elongated and compressed. Nets are used in catching the menhaden. After the oil is extracted, the remaining portions are used in preparing manures, which are shipped extensively to various countries in

need of fertilizing. The rich oils prevent the menhaden from being used extensively for food, though considerable quantities are



MENHADEN.

consumed for that purpose, and also for bait. Menhaden oil is useful in dressing leather. The annual production exceeds in value the yield from the whale of American fisheries.

MENINGITIS (mĕn-ĭn-jī′tĭs), an inflammation of the enveloping membrane of an organ, and especially of the meninges of the brain. It more frequently affects the convexity of the cerebral hemisphere than the base. In its earlier stages it is characterized by headache, and later by heaviness and vomiting. There are two forms of the malady, the acute and chronic. Acute meningitis generally terminates in death, while the chronic form develops into maniacal symptoms and finally into idiocy.

MENNONITES (mĕn′nŏn-īts), a religious sect founded by Simons Menno (1496-1561), in the Friesland province of Holland, and which now embraces a large number of communicants in Europe and the United States. Russia granted them immunity from military service to induce them to settle in that country, but in 1871 they were deprived of that privilege by the czar. Immediately a large emigration of Mennonites began to the United States. Settlements of large numbers were founded in Minnesota, the Dakotas, Nebraska, and Kansas, and some were attracted by liberal offers to settle in Canada. The Mennonites are a Protestant sect. They hold firmly to the New Testament, deny original sin, condemn infant baptism, observe foot-washing, baptize believers by pouring water on their heads while kneeling, hold to close communion, and do not take official oaths. The congregation selects the pastors, who serve without pay, and usually several ministers are selected for each congregation. At present there are about 225,000 adherents in the United States.

MENOMINEE (mę-nŏm′ĭ-nē), a city in Michigan, county seat of Menominee county, located on Green Bay, at the mouth of the Menominee River. It has a good harbor, extensive railroad connections, and modern educational and municipal facilities. Among its principal buildings are many schools and churches, and a fine courthouse. The manufactures embrace flour, carriages, machinery, clothing, lumber products, and earthenware. It has a large trade in lumber, iron, marble, and agricultural products. Population, 1904, 11,096.

MENOMONIE (mę-nŏm′ọ-nē), county seat of Dunn county, Wisconsin, on Cedar River, about twenty-four miles west of Eau Claire. It is extensively connected by railroads, has an excellent public school system, important municipal facilities, and enjoys a large trade in agricultural produce and manufactures. The products of its manufactories embrace carriages, flour, earthenware, machinery, cigars, and lumber. Population, 1900, 5,655.

MENSCHIKOFF (mĕn′she-kŏf), **Alexander Danilovitch**, distinguished soldier, born in Moscow, Russia, Nov. 17 (O. S.), 1672; died Nov. 2 (O. S.), 1729. He descended from a poor family, attracted the attention of Lefort, an officer of Peter the Great, and soon after was made a page of the latter. He became distinguished in the wars against Sweden, was accorded the order of St. Andrew, and in 1706 was made a general and a prince of the German Empire. His great-grandson, Alexander Sergeievitch Menschikoff (1787-1869), also became a general of great eminence. His bravery in the Russian campaigns of 1812 and 1815 led to his promotion to the rank of general, and subsequently he served against the Persians. In the Crimean War of 1853 he had general command of the land and naval forces. The battles of Alma and Inkerman were lost to Russia, but he displayed much bravery at both these engagements, and conducted the attacks against Sebastopol with marked ability. In 1855 Czar Nicholas died, and Menschikoff was recalled on account of failing health. In political affairs he represented the conservative party, which opposed many of the internal and military reforms.

MENSURATION (mĕn-shụ-rā′shŭn), the branch of mathematical science that relates to finding the length of lines, the area of surfaces, and the volume of solids. Since the area of a triangle is found by multiplying the base by half the perpendicular height, the area of a plane rectilineal figure may be found by dividing it into triangles, and then taking the sum of the area of the triangles as the total area of the figure. The area of a trapezium is equal to half the sum of two opposite sides multiplied by the distance separating them; and the area of any parallelogram is equal to the area of a rectangle having the same base and height. To find the circumference of a circle multiply the diameter by 3.14159; to find the area of a circle multiply the square of the radius by 3.14159; to find the diameter of a circle divide the circumference by 3.14159; to find the radius take half the diameter. The volume of any rectangular solid may be found by multiplying together the length, height, and width. Volumes of similar solids are to each other as the cubes of like dimensions.

MENTONE (mĕn-tō′nā), a city of France, in the province of Alpes-Maritimes, on the Mediterranean, twelve miles northeast of Nice. It is connected by railway with

French and Italian cities, has a fine location near the Alps, and is a favorite resort for invalids. The surrounding country is fertile, containing many beautiful gardens and orchards, and in recent times has enjoyed the impetus that comes from large productions of crops. Near the city are a number of remains of antiquity. Population, 11,680.

MENTZ, or **Mainz**, an important city of Rhenish Hesse, Germany, located on the Rhine River, near its confluence with the Main. It is a city of considerable antiquity, but since the explosion of a great powder magazine, in 1857, it has been rebuilt on modern plans. In the time of Roman occupation Mentz was a place of considerable importance, but barbarians destroyed it in 406. By the 13th century it again rose to importance as the head of the Rhenish League of towns. The emperor of Germany fortified it in 1871, and it now forms one of the military strongholds of the empire. There are extensive railroad connections, paved streets, electric lights and street railways, excellent public schools, and several institutions of higher learning. The parks are beautified by statues, among them one of Gutenberg by Thorwaldsen. Among the manufactures are toys, carriages, hardware, furniture, musical instruments, tobacco, cotton and woolen goods, and machinery. It is the seat of many churches and a beautiful cathedral. In the period of the Reformation Mentz sided with the Protestants, and since then has been noted as an ecclesiastical center. Population, 74,260.

MEPHISTOPHELES (mĕf-ĭs-tof'e-lees), a name thought to be of Hebrew derivation, and applied in legendry to designate one who does not love light. It was made famous by Goethe in his "Faust," in which Mephistopheles is regarded as representing the principle of evil, and as demanding possession of Faust's soul, because of fulfilling his commands.

MERCATOR (mẽr-kā'tọr), **Gerhard**, noted German mathematician and geographer, born in Rupelmonde, Flanders, May 5, 1512; died Dec. 2, 1594. His family name was Kramer, of which the name given in this article is the Latin form, and by it he is known generally. He secured a liberal education at Louvain, Belgium, and devoted his attention to mathematics and geography. Charles V. retained his services a number of years, and later he became cosmographer to the duke of Juliers and Cleves. He is noted for valuable additions to geographical research, and also for the invention of the projection that bears his name. By means of this projection it became possible for seamen to utilize the compass by steering in straight lines, instead of making spiral movements as required by other projections. He also published descriptions and maps of France, Germany, and Europe.

MERCURY (mẽr'kū-rў), **the Roman god** of commerce and gain, and later identified with the Greek Hermes. The Romans ascribed magic power to him, set May 25 apart as his festival, and erected temples at the Circus Maximus, and also a temple and a sacred fount near the Porta Capena. Marine merchants thought it necessary to go to the fount and sprinkle themselves and their merchandise with holy water in order to insure large profits on their wares. The Grecians connected Hermes quite generally with domestic life, and built many images to him in their cities, gymnasia, and other places of resort. He is represented as the son of Zeus and Maya by the Greeks, who regarded him the guardian of commerce, eloquence, and of robbers. In statuary he is seen with wings attached to his shoulders or feet, a staff in his hand, and his head ornamented with a broad-brimmed hat. Many excellent specimens of Greek and Roman sculpture of this divinity are still extant.

MERCURY, the planet nearest to the sun, unless it can be definitely established that the supposed Vulcan really exists. The most ancient account that we have of this planet is given by Ptolemy, who speaks of its location on the 15th of November, 265 B. C., and the earliest Chinese account of it describes its location on June 9, 118 A. D. Its rapidity of flight caused the ancients to name quicksilver after it. Mercury has an average distance of 35,550,000 miles from the sun, and is 3,200 miles in diameter. Its volume is about one-eighteenth that of the earth, but its density is one-eighth greater. The inclination of the orbit of mercury to the ecliptic is 70° 0′ 8″. Its sidereal revolution around the sun occurs in 87.96 days and a synodic revolution requires about 116 days. The greatest distance from the earth is 136,000,000, and its least distance 47,000,000 miles. The rotation on its axis is completed every twenty-four hours five minutes twenty-eight seconds. There is no moon to light the sky at night. In the spring and autumn Mercury is visible to the naked eye before sunrise and after sunset. Its greatest distance from the sun is 43,000,000 miles and the least distance 30,000,000 miles, thus there is about double the amount of the quantity of light and heat derived from the sun when it is in perihelion than when in aphelion, these positions being occupied every forty-four days. Transits of Mercury occur more frequently than those of Venus, and take place at intervals of from three to thirteen years, having occurred in 1832, 1845, 1848, 1861, 1868, 1881, 1891, 1894, etc. Transits occur only in May and November, and the greatest length can be only seven hours fifty minutes, though the majority are of much shorter duration. A transit to occur in 1924 approaches near the longest period of duration.

MERCURY, or **Quicksilver**, a metallic element known from the earliest historical

times, and the only liquid metal at ordinary temperatures. It freezes at 39.5° Fahr. below zero, gradually expands when heated, and boils at 357.25°. At 360° it rises in fumes and becomes gradually converted into a red oxide. At the ordinary temperatures it has a silvery-white color, runs in separate round drops with a smooth surface, and if impure the drops are somewhat elongated. Mercury occurs in a pure state, but is found most frequently in the form of sulphide, or cinnabar, and is mined in that form in California, Austria, Germany, Italy, Mexico, Peru, China, Borneo, and other countries. It is extracted from the sulphide by roasting the ore in a furnace, thus causing the sulphurous acid to escape, while the mercury is condensed in a chamber. Mercury is used in the preparation of the most powerful poisonous compounds, and serves many useful purposes in medicines. In thermometers it serves to indicate the temperature of the air, its high state of expansibility ranging between the boiling and freezing point, while in barometers it is used to ascertain the weight of the atmosphere. Alloys in which mercury is used are called amalgams. An amalgam of tin and mercury serves in preparing mirrors, while others are useful in filling and gilding teeth. It also enters largely into the chemical laboratory, in making philosophical instruments, and in imparting a degree of softness and fusibility to other metals.

MERCY, Sisters of, an organization of the Roman Catholic Church. It was founded at Dublin, Ireland, by Catherine Elizabeth McAuley in 1827. The original organization was designed to provide relief for orphans, destitute women, and others, but it soon assumed a religious character, and in 1841 it was approved by Pope Gregory XVI. The organizer became the first mother superior of the associations, and before her death there were forty-three branches of the order. Bishop O'Conner introduced the order into the United States in 1843. At present communities of Sisters of Mercy are distributed widely in America, Australia, Eurasia, and other grand divisions. The two classes of sisters are known as choir and lay-religious, and are bound by vows to seek the betterment of conditions for the ignorant, poor, and sick.

MER DE GLACE (maer de glās'), a celebrated glacier of Switzerland. It descends from the slopes of the range of Mont Blanc, and is formed by the confluence of three large glaciers, known as Lechaud, Geant, and Talefre. The different tributaries form far up in the mountain range, descend slowly until they merge into the Mer de Glace, or Sea of Ice, which descends far into the fertile valley below, carrying with it large quantities of bowlders from five to thirty-five feet in diameter, vast crevasses appearing at various bends in the course. The frozen mass of ice descends into regions studded with fine fields and orchards, but is at last melted and flows in a stream as a clear current of water.

MEREDITH (mĕr'ę-dith), **George**, novelist and poet, born in Hampshire, England, Feb. 12, 1828. He secured a liberal education in Germany, took a course in law, but afterward engaged in literary work. His first publication was a volume of poems in 1851, and four years later he published a burlesque in prose, entitled "Shaving of Shagpat." Subsequently he became a prolific writer, but his style is too elaborate to attract general favor, and his composition requires more than the ordinary amount of thought to grasp his excellent mental pictures. However, there is all through his writing a vein of thought giving evidence that he was ever a close student of sociology and public questions, and this element, linked with his vivid descriptive and inventive resources, make his works of more than ordinary value. His principal writings include "Evan Harrington;" "Ordeal of Richard Feverel;" "Tragic Comedians;" "Diana of the Crossways;" "Amazing Marriage;" "Ballads of Tragic Life;" "Lyrics of the Joy of the Earth;" "Reading of Earth;" "Modern Love;" "One of Our Conquerors," and "Tale of Chloe."

MERGENTHALER, Ottmar, inventor, born in Wurtemberg, Germany, May 10, 1854; died in Baltimore, Maryland, Oct. 28, 1899. He came to the United States at an early age, and, after working as a clockmaker, engaged as an electrical engineer. Though he never engaged as a printer, his attention was called to the invention of a machine to set type, and, after experimenting ten years, he announced the invention of his celebrated linotype type-setting machine in 1886. The Mergenthaler machine has since gone largely into book and newspaper publishing offices. It greatly revolutionized the printing trade, and ranks as one of the most valuable inventions ever made. Several improvements have been made, but the principles employed by the inventor are essentially unaltered.

MERIDA (mĕr'ĭ-dą), a city of Mexico, capital of Yucatan, situated twenty-four miles from the Gulf of Mexico, and about that distance south of Progreso, a seaport town. The Spanish founded Merida in 1542, and in 1598 completed its famous cathedral. It has good railroad connections, numerous public schools, and is the seat of a museum, a conservatory of music, a public library, and a university. The streets are regularly platted, and contain modern municipal facilities. There are manufactures of cigars, sugar, clothing, spirituous liquors, soap, machinery, leather, and fabrics. Population, 41,290.

MERIDEN (mĕr'ĭ-dęn), a city of Connecticut, in New Haven county, about eighteen miles north of New Haven. It has good railroad connections, electric lights and street railways, splendid educational insti-

tutions, and many modern municipal facilities. Meriden is the site of the Meriden Britannia Company, which is reputed the most extensive silver-plating establishment in the world, employing about 1,550 persons. Other manufactures of the city embrace steel pens, glassware, musical instruments, hardware, machinery, iron and brass castings, textile fabrics, and cutlery. The city has several large libraries. Among its general facilities are several fine schools and churches. Population, 1900, 24,296.

MERIDIAN (mĕ-rĭd'ĭ-*an*), a city in Mississippi, county seat of Lauderdale county, located about eighty-five miles east of Jackson. It is surrounded by a productive agricultural country, has good railroad connections, fine schools, and is the seat of two seminaries for girls. Among its public buildings is a fine courthouse. Its manufactures embrace cotton and woolen goods, furniture, farming implements, lumber products, flour, and tobacco. Meridian is the second city of the state in population, and is rapidly increasing its municipal facilities and commercial trade. Population, 1900, 14,050.

MERIDIAN, the great circle passing through the spot where the observer stands and through both poles. Properly there are as many meridians as places on the earth surface, and it is midday or noon when the sun reaches that place. Longitude may be reckoned in degrees, minutes, and seconds east or west of any given meridian, but in geography the degrees of longitude are indicated east or west of some particular meridian. No place can have a location higher than 180° east or west, since distance is measured only one-half round the earth from the meridian taken as a basis. Books and maps used in the United States indicate distance east and west from both Washington, D. C., and Greenwich, England, but a convention held at Washington in 1884 decided that the meridian of Greenwich, England, should be taken as the basis for the world, and that the astronomical day should begin at midnight, Jan. 1, 1885. Celestial meridians are imaginary circles that pass through the poles of heaven and the zenith of any locality on the surface of the earth.

MERINO (mĕ-rē'nō), a breed of domestic sheep originally reared in Spain, but now acclimated in the United States, Australia, and many other localities. This grade of sheep is noted for its excellent wool. It has long legs, is rather small in size, and its flesh is not highly esteemed. The males are horned and somewhat larger than the females.

MERIVALE (mĕr'ĭ-vāl), **Charles**, historian, born in London, England, March 8, 1808; died Dec. 27, 1893. He was the son of John Herman Merivale (1779-1844), a noted English scholar and translator, graduated from Cambridge in 1830, and afterward became a tutor and fellow at that institution. Later he was ordained as minister, became a preacher of the university, and in 1869 was made dean of Ely. He was also chaplain to the speaker to the house of commons for some time. His publications include "Fall of the Roman Empire;" "Conversion of the Northern Nations," and "General History of Rome." His brother, Herman Merivale, was born in 1806; died Feb. 9, 1874. He is also noted as an author and statesman. He graduated at Oxford in 1832, where he was appointed professor of political economy in 1837, and served a number of years as secretary for the colonies and for India. He wrote "Colonization and Colonies;" "Historical Study," and "Life of Sir Henry Lawrence."

MERLIN (mĕr'lĭn), a bird of the falcon family, differing from the genus falco in having longer and more slender tarsi and

COMMON MERLIN.

toes. It is bold in habits, and from ten to twelve inches in length. The color of males is somewhat variegated, having a bluish-gray tail, reddish-brown feathers on the back of the neck, bluish-gray on head, and breast and belly reddish-yellow. The females are uniformly of a bluish-ash color. The merlin builds its nest on the ground, and is sometimes used in hawking larks, quails, partridges, and other small game. Several species have been described. The common merlin of Eurasia resembles the American pigeon hawk.

MERMAID (mĕr'mād), a fabulous marine creature, having the upper half of the body like that of a woman and the lower like a fish, and associated with the merman, the male corresponding to the mermaid. These

beings are represented as having their homes in the sea. They are described in the legends of northern Europe and of other regions, and have entered extensively into poetry. It is thought that the dugong, a sea mammal, has been observed in its characteristic habit of holding its young while suckling at its breast and displaying its fish-like tail when diving, and thus gave rise to many of the early legends. Mermaids are frequently represented in paintings in the attitude of combing their long and beautiful hair while seated on a rock amid the dashing waves, and stories tell of their forming marriages with men, remaining faithful wives and mothers. In some of the legends it is represented that they live for a time on land and afterward entice their husbands to occupy ocean homes in unison with them. Many of the early traditions and legends are very beautiful and teach lessons of devotion and faithfulness quite as distinctly as the traditions and folk lore of heroes and early myths.

MEROVINGIANS (mĕr-ō-vĭn'jĭ-ans), the name derived from Merwig, who was king of the western Franks from 448 to 457, and was the founder of the Merovingian dynasty. This dynasty was the first of Germanic kings in Gaul, and was succeeded by the Carlovingian dynasty in 752. Clovis was the grandson of Merwig, and became the first Christian sovereign of the Franks, and Dagobert was noted as one of the most successful of the dynasty.

MERRILL (mĕr'ĭl), a city in Wisconsin, county seat of Lincoln county, on the Wisconsin River, sixteen miles above Wausau. It is noted as a lumber market, and manufactures lumber products, machinery, flour, cigars, utensils, and ironware. The railroad connections are convenient, giving it superior trade advantages. It has several fine public schools, electric lights, a public library, and other municipal facilities. Population, 1900, 8,537.

MERRIMAC (mĕr'ĭ-mȧk), a river of New Hampshire and Massachusetts. It is formed by the confluence of the Winnipiseogee and Pemigewasset rivers at Franklin, New Hampshire, flows almost due south into Massachusetts, thence has a northeasterly course, and discharges into the Atlantic Ocean near Newburyport. It is navigable to Haverhill, about sixteen miles. The Merrimac is noted for its important fisheries, and supplies an abundance of water power. Among the thriving cities on its banks in New Hampshire are Concord, Manchester, and Nashua; the cities in Massachusetts include Lowell and Lawrence.

MERRITT, Wesley, soldier, born in New York City, June 16, 1836. He graduated from the West Point Military Academy in 1860, entered the service with the rank of brevet second-lieutenant, and was assigned with his regiment to Utah in 1861. Subsequently he served with distinction in the Virginia campaign and rose to the rank of brevet major-general, this promotion being accorded to him on account of bravery at the battle of Gettysburg. In the Shenandoah campaign he took part in the battles of Cedar Creek, Winchester, and Fisher's Hill, and in 1865 became major-general. General Grant appointed him as one of three commissioners to arrange the terms of capitulation and receive the surrender of the army of northern Virginia, and in 1866 he was mustered out of the volunteer service. In 1882 he was chosen superintendent of the Military Academy at West Point. He became major-general of the regular army in 1885, and in 1898 was assigned to the new military department of the Pacific and the Philippines. In June, 1898, he sailed for Manila, and in August of the same year proceeded to Paris for the purpose of conferring with the American members of the peace commission. His services in every public relation were efficient, and he is recognized as one of the able military leaders of the United States.

MERSEY (mĕr'zĭ), a river of England, having its source by a union of the Etherow and Goyt in Derbyshire, and flowing, after a course of seventeen miles, into the Irish Sea near Liverpool. It courses through a fertile country, and has been made navigable by a canal to Manchester. A tunnel passing under it connects Liverpool with Birkenhead. Sandbars at the mouth of the river were removed in 1895, and it is now possible for large vessels to enter the river when at low-water mark. Its entire length is sixty miles.

MERTHYR-TYDVIL (mĕr'thẹr-tĭd-fĭl), a city of Glamorgan county, Wales, on the Taff River, about twenty-four miles north of Cardiff. It has extensive railroad connections, and is important principally on account of its extensive coal and iron mines. The streets are improved by paving, electric lighting, and waterworks. It is the seat of many important educational institutions and numerous churches. Population, 58,735.

MERV, an oasis of Asia, located in Turkestan, near the northeastern boundary of Persia. It is watered by the Murghab River, is sixty miles in length, forty in width, and has been improved by vast irrigation canals constructed under Russian supervision. The climate is favorable to the production of cotton, sugar, silk, wheat, and many varieties of fruit. There are manufactures of cotton, woolen, and silk fabrics, carpets, and utensils. Domestic animals, such as cattle, horses, camels, and sheep, are reared, while considerable activity is shown in the mining of silver. General Skobeleff captured the oasis in 1881, and since 1883 it has been Russian territory. A railway line has been built across Merv, which extends from the Caspian Sea to within a short distance of Chinese territory. Merv is the principal town. It is located on the railway line and river, and has important trade and manufac-

turing facilities. The inhabitants consist largely of Mongols, Arabs, Turkomans, and Russians. The town of Merv has a population of 4,650.

MESHED (mĕsh'ĕd), or **Meshid**, a city of northeastern Persia, capital of the Khorasan province. It is celebrated as the sacred city of the Shiites, an important sect of Mohammedans. The city contains one of the most excellent mosques of the Moslem world, is surrounded by a wall, and has several sepulchers, among them those of Nadir Shah, Haroun-al-Raschid, and the Persian poet Firdusi. It is also the seat of many schools, several minor mosques, public buildings, and a number of theological and independent colleges. The manufactures embrace clothing, jewelry, silk and cotton goods, rugs, velvets, carpets, sword blades, cutlery, and utensils. It has an important overland trade, being connected by caravan routes with Khiva, Bokhara, Herat, and Kerman. In its vicinity are productive turquoise mines. Population, 75,500.

MESMER (mĕs'mer), **Friedrich Anton**, eminent physician, born near Constance, Switzerland, May 23, 1734; died March 5, 1815. He was of German birth, secured a liberal education, and studied medicine at Vienna, where he secured a doctor's degree. After investigating with considerable care the subject of animal magnetism, he prepared several papers in relation to that subject and became the founder of the doctrine of mesmerism. In practicing upon patients he at first used magnets, claiming that magnetism exercises a marked healing influence upon the human organism, but later announced that there is sufficient magnetism in animal bodies to conduct healing operations. His first treatise on the subject was published in 1775, and in 1778 he settled temporarily at Paris, where he practiced the healing art with considerable success, and was offered a large compensation and an annual pension to instruct students at a hospital, but he preferred to keep his methods secret. Shortly after the French government appointed a commission to investigate his method, Benjamin Franklin serving as one of the commissioners. The report published was unfavorable to Mesmer, whereby he lost public confidence, and later returned to Switzerland, where he died in comparative obscurity.

MESMERISM (mĕs'mĕr-ĭz'm), a name originated from Friedrich Anton Mesmer, and used to describe peculiar conditions produced by one individual on the nervous system of another. Mesmer believed that the stars exercise an influence over man, but later was persuaded to produce what he called animal magnetism by stroking the bodies of patients, thereby effecting peculiar sensations on the nervous system of those who came for treatment. In doing so he attracted general attention to the arts pursued by different individuals in early ages, and many of his followers became able to effect similar phenomena, and later reduced the system to a science. Such terms as hypnotism, odylic force, electrobiology, and animal magnetism imply practically the same art as mesmerism, and are effected in substantially the same manner. Among the conditions necessary are that the person to be mesmerized gaze fixedly at some bright object, or at some individual; that the hands of the mesmerizer be passed over him according to some fixed rule; or by having the eyes fixed steadily on some object and the operator completing the operation by breathing on the person. The patient is caused by these means to pass into a state resembling sleep, and while thus affected he remains unconscious.

Various stages of mesmerism are recognized, the most severe including muscular rigidity. During such a state the muscles are set rigidly as in a severe case of catalepsy, and the patient may be lifted by taking hold of his feet and head; the muscular rigidity holding the body in a horizontal position. While in this state the patient is devoid of sensation, and is insensible to pain, while during a state of being slightly hypnotized he may be made to imagine various things, such as believing himself a different individual, seeing peculiar things, feeling uncommon sensations, or smelling peculiar odors. Mesmerism has been successfully employed as a therapeutic agent in various diseases, especially in sleeplessness and several others resulting from nervous derangement. Some have gone so far as to profess that they possess power to communicate with persons at a distance, forecast the future, and to produce various other phenomena. However, these claims must be taken with some allowance. Phenomena of a similar character are attributed by some to spiritualism, by others to clairvoyance, and also to mind-reading.

The theories of spiritualism attribute the various phenomena of mesmerism to spiritual influences, while clairvoyance is held to be a natural trance condition, thus differing from the artificially induced mesmerism or hypnotism. Mind-reading in the ordinary instances of contact is usually explained by muscle-reading, but in cases of absence it is attributed to spiritual influences. Odylic forces is a term applied by Baron von Reichenbach to influences which he claimed exist, and by reason of them mesmeric and kindred phenomena are to be explained. Electrobiology attributes them to electricity produced in the body. Many scientific investigations have been made in recent years, and much attention has been directed to the subject at accredited institutions. Dr. Heidenhain, of Breslau, Germany, is one of the most eminent men of recent times to give the subject attention. In his work, known as "Animal Magnetism," he expresses the view that mesmeric and similar influences are brought about by producing temporary

suspension of the brain forces that control voluntary motion, and that when such control is suspended it is possible to influence the senses so that involuntary movements may be produced.

MESOPOTAMIA (mĕs-o-pō-tā′mĭ-ạ), the name applied anciently to the entire region situated between the Euphrates and Tigris rivers, but at present it is used by Asiatic people to designate only the northern part. Anciently the entire region was associated with the monarchies of Babylon and Assyria, and was improved extensively by irrigation and navigation canals. The soil is naturally fertile, but the limited amount of rainfall renders it unproductive unless artificially watered, and on that account it is used at present principally for pastoral purposes. The entire region includes about 54,500 square miles. After its conquest by the Turks, in 1515, its irrigation was interfered with to some extent, on account of which much of it has fallen back to its original barren state. The principal industry is the rearing of herds of sheep, camels, goats, and cattle, but in some portions there are productions of tobacco, cotton, millet, barley, wheat, hemp, and fruits. Nineveh and Harran were among the ancient cities. The region passed successively under the dominion of Assyria, Babylon, Persia, Greece, Rome, and Arabia. At present it forms a part of the Turkish Empire.

MESOZOIC (mĕs-ō-zō′ĭk), the name commonly applied to the geological period between the Paleozoic and the Cenozoic. The epoch is also termed the Secondary period. It includes the age of reptiles. The rocks are known as Triassic, Oolitic, and Cretaceous.

MESSENIA (mĕs-sē′nĭ-ạ), or **Messena**, a region of ancient Greece, located in the southwestern part of the Peloponnesus, and famous for its fertility and production of wheat. In the early history of Europe it possessed great opulence and power, but was vanquished by two wars with Sparta, known as the Messenian wars, the first of which took place from 743 to 724 B. C., and the second from 685 to 668 B. C. Both wars terminated in defeat to the Messenians, after which they emigrated largely to Sicily, and from them the present Messina received its name. Messenia is now the name of a Grecian nomarchy, which has an area of 1,225 square miles and a population of 191,350.

MESSIAH (mĕs-sī′ȧ), a term identical with the Greek word Christos, and meaning the Anointed. Its equivalent, as for instance the Hebrew mashiackh, was applied to various gifted leaders of different nations, both Jewish and Gentile, especially those anointed with holy oil and whose reign was marked with the greatest prosperity. The prophet Daniel mentions a Messiah who was to appear and rebuild Jerusalem, but the city was to be destroyed by foreign invaders. The Jews applied the messianic prophecies as foretelling of a temporal king, who they thought would rise to liberate them from the oppression of foreigners. Jesus Christ affirmed himself to be the Messiah of Daniel's prophecy, and especially declared that the kingdom of God based upon the truth taught by him shall never be destroyed. All Christendom has acknowledged the claim, but according to Jewish belief the Messiah is still to be expected.

MESSINA (mĕs-sē′nä), the most important commercial city of Sicily, capital of a province of the same name, situated on the Strait of Messina. It has a beautiful location, is well built, and contains a number of modern municipal improvements. There are excellent railroad facilities, and its harbor is one of the most convenient on the Mediterranean. The manufactures embrace principally silk, cotton, and woolen goods, clothing, hardware, machinery, coral products, and fruit essences. Its commercial trade is important, fully 3,500 vessels entering its harbor annually. It has a large trade in fresh and salt fish, fruit, pottery, cereals, and merchandise. The city has good schools, a cathedral founded in 1098, and a university established in 1548. The university has a library of 60,000 volumes, and is supplemented by a number of academies, seminaries, and colleges. Emigrants from Messenia founded the city in 732 B. C., and subsequently it passed into possession of the Carthaginians, Romans, Saracens, Normans, Spaniards, Neapolitans, and in 1861 was made a part of Italy. The city now has a population of 146,875. The province of Messina contains an area of 1,768 square miles, and a population of 501,315.

META (mā′tä), a South American river, which has its source in the Andean Mountains. It flows northeast a distance of 700 miles, and joins the Orinoco in Venezuela. The larger portion of its course is through Colombia. Its valley is noted for its fertility and luxuriant vegetation.

METALLURGY (mĕt′*a*l-lûr-jў), the art of economically extracting metals from ores, including smelting, reducing, refining, alloying, and kindred processes. The methods employed in extracting metals from ores differ somewhat. Various metals are found in a pure state. Such is the case with gold, silver, platinum, and many others, when they are said to be virgin or native, and are washed in troughs to separate them from other substances. This process was employed quite generally in early mining in California, Australia, and Alaska, but in the larger mining enterprises the metals are found mostly in combination with various ores, such as chlorine, oxygen, sulphur, and others, and to secure the ores it is necessary to employ vast boring machinery and powerful explosives. The ores are taken from the mines to a crushing mill, where they are ground by large rollers into small particles, and after-

ward the different metallic substances are separated by machinery. In some localities the stamping-mills are used instead of crushing-rollers to reduce the ore to fine particles, which is usually the method of treating tin ores, as they need to be reduced to a fine powder. In stamping-mills heavy pieces of iron are lifted to some height above the ores, and in falling by their own weight crush the substances like hammers. After the ore has been reduced to a state sufficiently fine, it is sifted on a jigging sieve to separate the finer portions that include the more valuable metals, and these portions are next washed in water. It is apparent that the heavier metals will sink more quickly than the lighter; thus the more valuable form a layer at the bottom of the water, while the lighter and less valuable make up a layer at the top. The latter are raked off, while the lower and purer are ready for smelting, a process of calcination or roasting by which volatile constituents are expelled.

METALS, the elementary substances that form a base by combining with oxygen, and that are distinguished by chemists from other elementary substances known as metalloids, or non-metals. It is difficult to form a definition that embraces all the metals and excludes all non-metallic substances, for the reason that the two classes approach each other by various characteristics in which the marks of distinction become peculiarly imperceptible. Chemists usually place fourteen elements in the list of non-metallic substances. These include one liquid, five gases, and eight that form solids at ordinary temperatures, as follows: oxygen, hydrogen, nitrogen, sulphur, selenium, tellurium, phosphorus, chlorine, bromine, iodine, fluorine, carbon, boron, and silicon.

Among the principal characteristic properties of metals are opacity; metallic luster; solidity, except mercury at ordinary temperatures; insolubility in water; capability of forming salts when in a state of oxide, and the capacity of conducting heat and electricity. Many metals possess a ductility sufficient to admit them to be drawn out into wires, while some have a malleability that renders them capable of being rolled or beaten into thin sheets. Chemists usually regard forty-eight elements as metals, which they divide into the light and heavy classes, and according to this classification there are various subdivisions. The light metals are subdivided as follows: true earth metals—aluminum, cerium, didymium, erbium, glucinum, lanthanum, terbium, thorium, zirconium; alkaline earth metals—barium, calcium, magnesium, strontium; and alkali metals—cæsium, lithium, potassium, rubidium, sodium. The following is a subdivision of the heavy metals: metals whose oxide may be reduced by heat—gold, iridium, mercury, osmium, platinum, palladium, rhodium, ruthenium, silver; metals whose oxide forms weak bases—arsenic, antimony, columbium or niobium, molybdenum, tantalum, titanium, tin, tungsten, vanadium; and metals whose oxides form powerful bases—bismuth, cadmium, cobalt, copper, chromium, iron, lead, manganese, nickel, thallium, uranium, zinc.

Besides the forty-eight named, there are several others regarded metals by some writers, but which have not been included. The ancients knew of only six metals, the list including gold, silver, copper, tin, iron, and lead, and their properties gave shape to the idea of a metal. Owing to the fluidity of mercury, it was not originally accepted as a metal, but, when it was found that it is hard and malleable in a frozen condition, its metallic property was admitted. In later times the isolation of the bases of the alkaline earths introduced among the metals elements that were not heavy, so that an exact scientific definition became impossible. Besides, several metals discovered in recent times exist in such small quantities that they are detected only by spectrum analysis, and it is quite likely that others will be added to the recognized list of metals. The different classes of metals unite with sulphur, oxygen, and chlorine, thus forming sulphides, oxides, and chlorides, and there are also numerous combinations with iodine, fluorine, and bromine.

METAMORPHIC ROCKS (mĕt-ȧ-môr'-fĭk), a term applied in geology to rocks originally deposited in layers, but afterward so changed by the action of heat as to lose all traces of stratification. Metamorphism is caused by heat acting under pressure in the presence of moisture, and consists principally of a re-arrangement in the chemical constituents of the rocks. Most of the metamorphic rocks are non-fossiliferous, but there are some in which all traces of fossils have not been destroyed. They occur in various periods, and consist principally of gneiss, schist, eurite, serpentine, quartz rock, clay slate and crystalline limestone. Some of the metamorphic rocks have lost all traces of stratification, though others show evidences of having been formed by sedimentary deposits.

METAMORPHOSIS (mĕt-ȧ-môr'fō-sĭs), a transformation in the character, structure, form, or shape of anything. It is applied in entomology to the series of transformations which insects undergo in their process of development from the egg to full maturity, and in zoölogy to the changes that take place from the time that an animal is excluded from the ovum or egg until sexual maturity is attained. In chemistry it has reference to chemical action caused by the presence of a peculiar substance, as a ferment, resulting in the decomposition of a compound; while in botany it is applied to the modification of one organ into another, as petals into stamens, and stamens into pistils.

METAPHOR (mĕt'ȧ-fēr), a figure of

speech in which one object is likened to another. It is used for the purpose of implying that characteristics possessed by the one to which it properly belongs are possessed in at least some measure by the person or object to which it is applied. In the expression used by the Psalmist describing God's law as "a light to my feet and a lamp to my path," the use of metaphors is finely illustrated. The expressions, "He was a lion in the fight" and "That man is a fox" take advantage of metaphor. In the expressions, "He fought like a lion" and "That man is like a fox" similes are used; a simile differing from a metaphor in that a word of likeness is always expressed in the former.

METAPHYSICS (mĕt-à-fĭz'ĭks), a term first applied by Aristotle to a group of philosophical dissertations of which the ultimate principles of being, the science of the first principles of knowing, and the science of God, as the prime cause of all things, were made the basis. The term is now employed to designate the science treating of subjects incapable of being dealt with by physical research. In this acceptation it embraces that branch of philosophy which deals with the conceptions or principles at the basis of all phenomena, including being, substance, time, motion, space, reality, change, identity, difference, cause, and others. Metaphysics is now divided into general and special. The former is called ontology, and includes the science of being in general. Special metaphysics is sometimes called pneumatology, and embraces natural theology; rational cosmology, the science of the origin and order of the world; and rational psychology, which treats of the nature, faculties and laws of the human mind. See **Psychology**.

METEOROLOGY (mē'tê-ĕr-ŏl'ô-gў), the science or department of natural philosophy that treats of the phenomena of the atmosphere. It relates especially to weather and climate, traces their relations to each other, and investigates the laws by which they are governed. This branch of study has come down from remote antiquity, but it did not take on its present extensive form and utility until the construction of telegraphic communication. Observations of weather and climate were made by the early Egyptians, whose general discoveries were gathered by Aristotle and published in connection with his own observations. Later the pupil of Aristotle, Theophrastus, classified many of the accepted signs that indicate stability or changes of weather, and give evidence of approaching rain and storm. When such instruments as the thermometer, barometer, and hydrometer were invented, great strides of progress were made in meteorology, which, together with extensive explorations of the continents and oceans, facilitated the publication of observations that soon reduced the study to a science. When printing was invented, reports of the climatic conditions of different countries began to be published, and with the construction of telegraphic and telephonic communication it became possible to communicate impending changes of weather and climatic conditions to remote localities, thus furnishing security against many of the damaging effects of tornadoes on land and sea.

Societies for the investigation of laws that regulate meteorological variations were formed in the early part of the last century, and toward the latter half of that century many of the leading governments began to establish public observatories. Since all the various phenomena are due to the action of the sun, but are variously affected by the altitude, size of land masses, proximity to the sea, winds, and the character of the soil, it has been the purpose to make observations in relation to the various characteristics of weather and climate in different localities at the same time, and also to make a record of variations at different times in the same locality. The former serve to secure intelligence regarding changes in the weather generally, while the latter aids in obtaining knowledge of the mean average rainfall and temperature of particular places. Many countries have also taken special means to study the direction, locality, and probability of winds, and to place the results, together with other valuable observations, on tabulated weather charts and meteorological maps.

Benjamin Franklin was among the first to make careful observations of meteorological phenomena in America, and was one of the earliest to call attention to the fact that storms of the northern states come largely from a westerly direction. Thomas Jefferson began taking observations at different points in 1772, and for that purpose established several stations, the two most important being at Monticello and Williamsburg, Virginia. Prior to that observations were made in particular localities, but Franklin led the way in making simultaneous investigations, and after the invention of the telegraph results were quickly communicated to various districts. The United States Weather Bureau is now the most efficient in the world. It was originated in 1870, and in 1891 was placed under the direction of the department of agriculture. This bureau publishes forecasts of the weather twice daily, and causes them to be telegraphed to the various stations at which signals are displayed for the benefit of the public. It also issues annually weather maps and numerous publications of a varied character. The forecasts made of the weather usually extend from twenty to thirty-six hours in advance.

METEORS, the small particles of matter that are thought to have their origin in disintegrated comets, and move around the sun in orbits of their own. It is thought that there are many millions of meteors promiscuously distributed through space. They are variously known as shooting-stars, aërolites,

fireballs, meteoric stones, meteorolites, and falling stars. However, our knowledge of these bodies is confined to the relatively few which collide with the earth. When moving through space their appearance is that of dark bodies, but, when coming in contact with the earth's atmosphere, they become suddenly converted into heat by the friction resulting from passing swiftly through it. Generally the entire meteor is vaporized by the friction, the exterior being brushed off by the air as soon as melted, often leaving a visible train in the sky.

Meteors rarely appear more than one hundred miles above the surface of the earth, and generally become dissipated before coming within twenty-five miles of the surface. It is certain that the speed with which they pass through space is controlled by the sun, for the reason that this speed is comparable with the speed of the earth round the sun. It has been well established that meteors have regular orbits, and that they originate from comets, this being demonstrated by groups of meteors that exist where formerly comets moved in fixed orbits. These meteors now travel in the same track, a fact especially true of Swift's comet, known since 1862, when it was established conclusively that meteors now occupy the orbit of that comet. Meteors consist of various known chemical elements, and about one-third of all the elemental substances recognized in the earth's crust have been discovered, among them iron, sulphur, sodium, calcium, chlorine, carbon, and many others. Those that fall usually abound in stone, but in some instances there is a mixture of stone and iron, and in rare cases iron predominates. The fall of a meteor is accompanied by a peculiar noise as it passes through the air, and when falling to the ground an explosion frequently results. At night and sometimes in daytime a long train of light is seen to follow its trail.

The most remarkable meteor observed in recent times fell in Iowa on May 10, 1879, in the vicinity of Storm Lake, the heaviest stone weighing 437 pounds. A meteor found in Texas weighs 1,635 pounds, and is now a part of the Yale collection. A meteor weighing 1,400 pounds, now at the United States National Museum, Washington, was found near Tucson, Arizona; and one in the Amherst collection, taken from Colorado, weighs 435 pounds. Remarkable meteors fell in Alsace in 1492, in Normandy in 1803, and in New York in 1860. Showers of meteors occur most frequently in August and November. The Leonides group of meteors, which is calculated to have a revolution around the sun every thirty-three years, is seen in November. It appeared with unusual brilliancy on November 13, 1833, and again in 1866, but in 1899 it was less brilliant. Many other groups of meteors exist, the most important being the Lyraids, that appear in April; the Pagasids and Perseids, in August; the Andromeds, in November, and the Orionids, in October and November. Astronomers have estimated the number of meteors that traverse the atmosphere daily, including only those that are large enough to be visible to the naked eye on a dark clear night, at no less than 7,500,000.

METHODIST (mĕth'ŏ-dĭst), one of the leading Protestant religious sects. It was organized at Oxford, England, about the year 1727, including in its membership George Whitefield and John and Charles Wesley. The first society of the Methodist Church in the United States was founded in New York City in 1766, and the first conference was held in Philadelphia in 1773, when 1,106 members attended for general deliberation. At present there are seventeen Methodist denominations, which include 36,750 ministers, 53,525 churches, and 5,859,520 communicants. Collectively the different denominations have eighty-seven institutions of learning, 885 professors, and 8,990 students. Among their organizations to promote religious influence are the American Bible Society, Epworth League, Woman's Home and Foreign Missionary Societies, Sunday School Union, and Board of Church Extension. There are many excellent periodicals, fine institutions of learning, and a thoroughly organized force of missionaries. The Methodist denominations of the United States are the most numerous of the Protestants, and nearly approximate the membership of the Catholic Church. The Methodist Episcopal denomination is the largest, and represents a membership of 3,350,000, but the total population classed as Methodist is much larger.

METHUEN (mẹ-thū'ẹn), a town of Massachusetts, in Essex county, two miles northwest of Lawrence. It has good railroad connections, and manufactures boots and shoes, cotton and woolen goods, machinery, cordage, and hats. An electric railway system connects it with neighboring cities. It is supplied with waterworks, a library of 15,000 volumes, and a number of excellent schools. Population, 1900, 7,512.

METONYMY (mẽ-tŏn'ĭ-mў), the exchange of names between things related. It is a figure of speech, consisting in the naming of a thing by one of its attributes, as substituting the material for the thing made, or the inventor for the thing invented. For example, we say a man keeps a good table, or we have read Virgil, meaning in the first case that the food is good, and in the second that we have read the writings of Virgil.

METRE, or **Meter**, a term used in prosody to designate the succession of certain groups of syllables. The metre in classic languages depended upon the way in which long and short syllables succeeded one another, but in English metre depends upon the arrangement of accented and unaccented syllables. In each metre there is one

accented syllable and one or two unaccented. Metre is also a name applied to a French measure of length, and which equals 3.28 feet, or 39.37 inches.

METRIC SYSTEM (met'rĭk), a system of measurement adopted in France by a convention in 1795. It bases all measures of capacity, weight, length, and area upon the value of a quadrant of the meridian measured between the equator and the poles. The system is a great improvement over all other systems for the reason that it is purely decimal. It has been adopted in many of the European countries for all purposes of measurement, and obtains in the coinage and money system of the United States. Though rarely used in ordinary business transactions in the United States, it is employed extensively by government officials and scientific men. The meter is the standard of the metric system, which was supposed to be one ten-millionth of the distance from the equator to the pole, measured on the earth's surface at the sea-level. It is 39.37 inches long. The liter is the unit of measures of capacity both for solids and liquids, and equals the cube of one-tenth of a meter, or 61.027 cubic inches, or 1.76 pints. The gram is the unit of weight. It is equal to about 15½ grains troy weight, and equals the weight of a cubic centimeter of distilled water at a temperature of about 39° Fahr. The following are the tables:

LONG OR LINEAR MEASURE.

10 millimeters (mm)	=1 centimeter (cm)
10 centimeters	=1 decimeter (dm)
10 decimeters	=1 meter (m)
10 meters	=1 decameter (Dm)
10 decameters	=1 hectometer (Hm)
10 hectometers	=1 kilometer (Km)
10 kilometers	=1 myriameter (Mm)

MEASURES OF CAPACITY.

10 milliliters (ml)	=1 centiliter (cl)
10 centiliters	=1 deciliter (dl)
10 deciliters	=1 liter (l)
10 liters	=1 decaliter (Dl)
10 decaliters	=1 hectoliter (Hl)
10 hectoliters	=1 kiloliter (Kl)

MEASURES OF WEIGHT.

10 milligrams (mg)	=1 centigram (cg)
10 centigrams	=1 decigram (dg)
10 decigrams	=1 gram (g)
10 grams	=1 decagram (Dg)
10 decagrams	=1 hectogram (Hg)
10 hectograms	=1 kilogram (Kg)

METTERNICH (mĕt'ẽr-nik), **Clemens Wenzel Lother, Prince von,** Austrian statesman, born in Coblentz, Germany, May 15, 1773; died at Vienna, June 11, 1859. He descended from a distinguished family, was educated at the University of Strasburg, and later completed a law course at Mentz. In 1798 he attended a congress at Rastadt, where he represented the German princes, and in 1801 became ambassador at Dresden, but was transferred to Berlin two years later under an appointment from Austria. In 1806 he was appointed ambassador to Paris, concluded the treaty of Fontainebleau in 1807, and, when the war of 1809 between France and Austria began, he became minister of foreign affairs, guiding the course of Austria through the difficulties of 1812-13. His first acts included a treaty of peace with France in 1809, and he also negotiated the marriage between Napoleon and Maria Louisa of Austria. After the French forces were reversed in Austria in 1813, Metternich led the movement that induced Austria to declare war against France, and subsequently concluded the quadruple alliance. In the same year the emperor of Austria created him a prince, and in 1815 he signed the second treaty of Paris as Austrian plenipotentiary. He was made chancellor in 1821, and continued to direct in a large measure the policy of European powers until in 1848, when he was compelled to flee by the revolutionary movement. England was his place of refuge, where he remained until 1851, when he returned to Vienna and was shown marked honors by the emperor. He continued to exercise much influence in European affairs until his death.

METZ (mĕts), an important fortified city in Germany, located on the Moselle, in the imperial territory of Alsace-Lorraine. It was known as an important town during the Roman occupation, fell to Germany by the division of Charlemagne's empire, and in 1552 was captured by the French. In the Franco-German War of 1870-71 it formed the principal stronghold of France on the northeastern boundary. It was held by a large military force under Bazaine, but was captured on Oct. 27, 1870, after a long siege by the German army, when 180,000 men became prisoners of war. Since the annexation of Lorraine to Germany Metz has been greatly strengthened as a fortified city, and has developed materially in commercial and manufacturing enterprises. The manufactures embrace leather, cottons, hosiery, clothing, silk and woolen goods, musical instruments, machinery, toys, and earthenware. There are extensive railroad connections, electric lights and street railways, public parks, fine educational institutions, and several libraries. Its fine cathedral was founded in the 14th century, and has a spire 373 feet in height. Population, 60,925.

MEUSE (mūz), a river of Europe, having its source in the Cote D' Or Mountains of France, thence flows northward through Belgium, and after entering the Netherlands it becomes known as the Maas River. Its entire course is 565 miles, of which 430 miles are navigable, or to Verdun. It enters the North Sea by several mouths. There are many excellent cities on the river, among them Rotterdam, Liege, and Sedan.

MEXICO, county seat of Audrain county, Missouri, about 105 miles northwest of St. Louis. It is well connected by railroads, and surrounded by a productive farming and dairying country. The manufactures include flour, wagons, machinery, and earthenware. There are electric lights, good schools, a military academy, and a seminary

for women. It is the seat of Hardin College. Population, 1900, 5,099.

MEXICO, the capital city of the Mexican republic, located in a beautiful valley about 7,350 feet above sea-level, in the south-central portion of the country. Surrounding the city are a number of hills, and in its vicinity are several lakes, of which Lake Tezcuco is the most important. The city is beautifully platted, has regular and well paved streets, and is beautified by splendid avenues of trees and public parks. Highways substantially paved extend many miles into the country, while important railroad lines connect the city with all parts of the country, and also with portions of the United States and Central America. It has a fine system of public waterworks, electric lighting, street railways, public schools, colleges, and a central university. The architecture differs from that of other large cities of America in that it is not as high, which is accounted for by the occurrence of earthquakes at various times. In the center of the city is a magnificent cathedral founded in 1573. Other splendid buildings include the national capitol, several palaces, a national museum, the postoffice building, and many excellent business blocks.

The climate of the city of Mexico is mild and healthful, a fact contributing to the rapid growth of the city in recent times. It has manufactures of cigars, jewelry, machinery, carriages, fabrics, laces, spirituous liquors, and earthenware, but these are chiefly in the hands of foreigners. The wholesale trade with surrounding districts is important, and its railroad shops are extensive. Mexico is situated on the site of Tenochtitlan, an ancient city of the Aztecs, which was founded by them in 1325. It was the capital of the Montezumas, and was captured by the Spanish under Cortez in 1521. The ancient city possessed vast wealth and much beauty at the time of the conquest, but was destroyed, and Mexico founded in its place with the assistance of a large force of natives. For about 300 years it was one of the most noted cities of imperial Spain, became the capital of Emperor Maximilian, and has been the seat of the republic since its establishment. Among its monuments is one built in memory of the last Aztec emperor, and one erected to Columbus in 1877. Population, 356,780.

MEXICO, a republic of North America, whose general boundary is formed on the north by the United States, east by the Gulf of Mexico and the Caribbean Sea, south by Central America, and west by the Pacific Ocean. Its length is about 2,000 miles, breadth from 125 to 1,000 miles, and area 767,316 square miles. The tropic of Cancer divides it into almost equal portions, thus placing it partly in the north temperate and partly in the torrid zone. The coasts embrace a total of about 6,000 miles, and include several important inlets and gulfs, of which the most extensive are the gulfs of California, Campeachy, and Tehuantepec. There are many small but fertile islands off the coast that belong to the republic, and it also includes the peninsulas of Lower California and Yucatan. The lakes are numerous, but none of them attains to a large size, the more important being Chapala, St. Nicolas, del Jaco, Tlahuahla, Texcuco, and Parras.

The greater portion of the surface is an elevated tableland at many points fully 8,000 feet above sea-level, sloping quite abruptly toward the Gulf of Mexico, and somewhat less abruptly toward the Pacific. The mountains are a continuation of the Cordilleras of North America, and include ranges known as the Sierra Madre, Sierra Madre del Sur, Sierra de Tarahumare, and Sierra de Navarit. The different ranges trend almost uniformly from the southeast toward the northwest, and embrace a number of lofty peaks and active volcanoes. Among the most noted mountain peaks are Popocatapetl, elevated 17,784 feet above sea-level; Orizaba, 17,380 feet, and Iztaccihuatl, 15,705 feet. Many of the peaks extend above the snow-line, which is about 15,000 feet high, and there are several glaciers and rapid-flowing mountain streams. Many of the highest elevations are extinct volcanoes, but some are still active. The principal rivers include the Rio Grande, Rio Conchos, Salado, Yagui, del Fuerte, Santiago, de Balsas, and St. Miguel. The rivers have their source chiefly in the mountain regions, since most of the lakes have no outlet to the sea. In most regions the climate is pleasant and healthful, which is attested by the fact that there are 725 centenarians as shown by the latest census.

Mexico is rich in many of the productive natural resources, and within recent years has developed rapidly under the present republic. There are vast forests of valuable timber, including evergreen oaks, palms, india-rubber trees, pines, and other useful species. Agriculture and mining are the principal industries, both of which are encouraged by enactments of the government. The principal agricultural products embrace corn, wheat, sugar-cane, cotton, coffee, barley, rice, beans, cacao, dye-plants, henequin, chick-peas, and tobacco, besides many varieties of tropical fruits. As a whole the stock industry is developed principally in the northern part, where large interests are vested in cattle, horses, sheep, mules, and swine. The mineral wealth is enormous, its silver production taking precedence at present as the most important of the world. Other minerals embrace gold, lead, copper, iron, mercury, sulphur, coal, antimony, tin, opal, magnesia, and rock-salt. The manufactures are still conducted mostly on antiquated methods, but there are important productions of cotton and woolen goods, sugar, cigars, and brandy. It also has a limited output of machinery, hardware,

leather, soap, earthenware, jewelry, toys, musical instruments, clothing, and utensils. The transportation facilities have assumed vast proportions, its railroad lines including about 10,600 miles. In various portions of the country are important tramways and a number of canals, the latter embracing both navigation and irrigation facilities. Telephone and telegraph lines have been built to connect all population centers, a large portion of which is under direct government ownership.

The government of Mexico is modeled largely after that of the United States, its constitution providing for the election of a president by an electoral college for a term of four years. The chief executive is assisted by cabinet officers and the legislative power is vested in a congress constituted of a senate and a house of representatives. Both senators and representatives are elected by a direct vote, the former including fifty-six members, and the latter 227, and suffrage is limited to all respectable male adults. Mexico is divided into twenty-seven states, two territories, and the federal district comprising the capital of the republic, to which is joined a small adjacent territory. Each state has its own legislature for local purposes, courts of justice, and a resident governor. The religion is almost exclusively Roman Catholic, but since 1857 there has been absolute religious freedom for all classes, and the church is divorced entirely from the state. Schools are maintained under government grants, but rely partly upon charitable donations, and the compulsory primary educational law is not enforced strictly in all the states. According to the latest census there is a population of 12,791,570, which is made up almost equally of males and females.

More than one-half of the people of Mexico are unable to read or write. The inhabitants consist principally of descendants from Spaniards and Indians, and all but 2,000,000 speak the Spanish language, though there are fully sixty different dialects. The standing army includes about 35,000 men and officers, but the navy consists of only a few vessels of material value. Scientific and educational associations are maintained in the larger cities, and numerous newspapers and other periodicals are beginning to circulate freely among the classes advanced in educational arts. The city of Mexico is the capital and metropolis. Other important cities are Puebla, Leon, Vera Cruz, Guadalajara, San Luis Potosi, Monterey, Pachuca, Durango, Zacatecas, Merida, Queretaro, Oaxaca, Morelia, Aguascalientes, Toluca, Colima, and Jalapa.

Much of the early history of Mexico has been gathered from tradition and the hieroglyphics found on its monuments. According to the best authorities its early history is divided into the two periods of Toltecs and Aztecs. The Toltecs are thought to have occupied a large region in the center of Mexico, extending from the Gulf of Mexico to the Pacific Ocean. They not only possessed a knowledge of agriculture, but constructed highways, founded cities, built temples, and reared monuments and pyramids, many of which have thrown much light upon their customs and material industries. In about the 11th century they occupied Yucatan and portions of Central America, and by the early part of the 13th century the Aztecs moved southward and occupied the regions of the city of Mexico, on whose site they founded the ancient city of Tenochtitlan in 1325. It is thought that the Aztecs were constituted largely of a mixture of Toltecs and of other North American Indians, and it is certain that they possessed less advancement in civilized arts than the earlier occupants of Mexico.

In 1519 Cortez landed with a force of Spaniards in the region now occupied by Vera Cruz, and two years later the country was conquered, when Cortez named it New Spain, and remained its captain-general until in 1535. The method of Spain, like that of most countries pursuing policies of foreign conquest, was directed with a view of utilizing the natives as slaves in the development of mines and plantations and to monopolize its trade. Under this policy Mexico remained oppressed for more than 300 years, or until 1821, when the last of fifty-seven imperial viceroys was compelled to surrender Spanish authority. The rebellion properly started in 1808, while Spain and France were at war, the Mexicans thus profiting by Spanish complications at home. A chief of the insurgents, General Iturbide, became emperor on May 18, 1822, assuming the title of Augustine I., but the republican forces under Gen. Santa Anna remained active and forced the emperor to abdicate in 1823. He was shot after attempting to recover his possessions the following year.

Interior complications continued to disturb Mexican politics for some years. In 1836 Texas was separated by declaring its independence, and, after forming a republic, was admitted to the United States in 1845. The following year a war began with the United States on account of a boundary dispute, but Mexico lost in every battle, and in 1848 concluded peace by ceding about 500,000 square miles of territory. After the war with the United States, the government was represented largely by Santa Anna until in 1861, when General Juarez became its president. Soon after the country became involved in a war with France, Spain, and England, those countries sending allied troops to Mexico for the purpose of opening a way for internal improvements, and also to invalidate the confiscation of church property and the separation of church and state, which had been made by General Juarez. The difficulties were first terminated by a treaty of peace with Spain and England,

but France dissented and took possession of the city of Mexico by a military force in 1863. Archduke Maximilian of Austria was induced by Napoleon III. to become emperor of Mexico, a course against which the United States government remonstrated. However, General Juarez defeated the imperial forces. Maximilian was taken a prisoner and shot in 1867. General Juarez was elected president of the newly formed republic, a position he held until his death in 1872. He was succeeded by General Tejada, and in 1876 a revolution brought General Diaz into the presidential office. He administered the government with eminent ability, and in 1880 was succeeded in the office of president by Manuel Gonzalez. Diaz was again elected president in 1884, and on account of his vigorous and popular administration was reëlected in 1888, 1892, 1896, and 1900. Under his administration the country has been signally successful, progressing educationally and industrially.

MEXICO, Gulf of, the most important inlet from the Atlantic Ocean in North America, situated south of the United States and east of Mexico, and containing an area of 716,200 square miles. Its general shape is circular. The greatest length from southwest to northeast is about 1,115 miles; at its entrance from Florida to Yucatan it is about 500 miles wide, and midway between the two points is the western extremity of Cuba. Within the gulf are a number of small islands. The coastal lands are quite low. Among the principal rivers that flow into it are the Mississippi, Rio Grande, Colorado, Brazos, Apalachicola, Mobile, and Usumasinta. The Gulf Stream enters it through Yucatan Channel and passes out through the Straits of Florida. On or near its shores are the cities of Key West, Mobile, Matamoros, Galveston, and Vera Cruz.

MEYERBEER (mī'er-bār), **Giacomo,** musical composer, born in Berlin, Germany, Sept. 5, 1794; died in Paris, France, May 2, 1864. Originally his name was Jakob Beer; the name by which he is known was assumed in remembrance of a benefactor. His natural ability for musical arts made itself manifest very early, being able to play on the piano at five years, and at seven gave an exhibit of his skill in public by playing from Mozart. He took musical training under master musicians in Berlin and Darmstadt, and later studied the new Italian music of Rossini. His cantata "God and Nature" was written while at Darmstadt. In 1812 he wrote "Jephthah" at Munich, and after studying in Italy he began to compose in a new style that even surpassed the productions of Rossini. His compositions became highly popular, and when he appeared at Paris in 1830 the enthusiasm accorded him was the most expressive ever witnessed in that city. Later he appeared with equal success in the principal cities of Germany, Austria, Italy, England, Russia, and other countries. Meyerbeer was not only an excellent musician and artist, but gave many celebrated cantatas, compositions, and songs to the musical world, many of which are still popular in Europe and America Among the best known are "Robert le Diable;" "Huguenots;" "Prophet;" "Two Caliphs;" "Star of the North;" "Dinorah," and his last work, entitled "L'Africaine." The last named is a masterful composition. It was brought out in New York City in December, 1865.

MIAMI (mī-ăm'ĭ), a river of Ohio, which has its source in Hardin county, and after a course of 150 miles toward the southwest discharges into the Ohio River twenty miles west of Cincinnati. It flows through a rich agricultural country, furnishes valuable motive power, and for seventy miles is paralleled by the Miami Canal. The Little Miami River is about twenty-five miles east of the Miami. It has a course of one hundred miles almost parallel to it, and flows into the Ohio River six miles above Cincinnati.

MIAMI INDIANS, a tribe of Algonquin Indians who inhabited a region extending along Green Bay and Lake Superior, where they were found by the French in the 17th century. At that time they occupied palisaded villages, but in 1721 large numbers of them scattered to different parts of the valleys of the Miami and Wabash rivers. Their hostility to the Iroquois induced them to show a spirit of friendship toward the English in 1755-60, but later difficulties arose between them and the settlers. Under the leadership of their chief Little Turtle they defeated General St. Clair in 1791. Gen. Anthony Wayne was sent against them in 1794, and the following year they concluded a treaty of peace. Their lands from the Ohio to the Wabash were ceded in 1809. In 1812-15 they fought against the Americans. They removed to Indiana in 1818, and in 1846 the tribe was transferred to a reservation in Kansas. The Miamis lost their identity by intermarrying with the Peorias and Pawpaws. The recent government reports show only eighty-six distinct Miamis.

MICA (mī'kà), a group of minerals having certain allied characteristics, the most common being that they have a perfect basal cleavage, affording thin, tough scales. These scales or sheets may be so thin that it takes from 1,000 to 10,000 to equal an inch, this depending largely upon the class of mica. Some writers who have recently investigated this difficult group of minerals class them all with the monoclinic system; that is, crystallines possessing one symmetrical plane and dipping in only one direction from the axis of elevation. Some species of mica are brittle and break into small sheets or plates, but others are tough and occur in large plates fully twenty inches in diameter. They also vary from colorless to jet black, from transparent to translucent, and are of widely different chemical com-

position. The constituents of most micas are made up essentially of silicates of aluminum and an alkali, as sodium, potassium, or lithium. Extensive deposits are found in North Carolina, New Hampshire, Oklahoma, Peru, Siberia, the Scandinavian peninsula, and Russia. Among the different varieties are paragonite, or sodium mica; muscovite, or potassium mica; zinnwaldite, or lithium-iron mica; lepidolite, or lithium mica; lepidomelane, or iron mica; phlogopite, or magensium; biotite, or magnesium-iron mica; and roscoelite, or vanadium mica. The principal use of mica is for lights in lanterns, stoves, and windows, its transparent quality making it of value for these purposes. It is less liable than glass to breakage by a sudden change of temperature or discharge of large implements of war, on account of which it is employed extensively on battleships as a substitute for glass.

MICAH, one of the twelve minor prophets, and usually given as sixth in the list. He is regarded a native of Gath and prophesied in the reigns of Jotham, Ahaz, and Hezekiah, kings of Judah. It is thought that he flourished as a contemporary of Hosea, Isaiah, and Amos in about 759-698 B. C. Micah prophesied in a clear, vivid style, and his passages are richly poetical, the last several chapters being especially beautiful. His prophecies include predictions of the restoration of theocracy, promises of forgiveness, and a forecast of the destruction of Jerusalem. He also exhorts earnestly to repentance, and denounces all forms of cruelty and wickedness of the rulers.

MICHAEL ANGELO. See **Angelo.**

MICHEL (me-shĕl'), **Louise**, revolutionary leader, born in Vroncourt, France, in 1839. Her poetical and musical productions attracted the attention of Victor Hugo, who encouraged her to locate at Paris, where she opened a training school in 1860. After the Franco-German War she became noted as a revolutionary communist. In 1871 she was placed under arrest as an influential leader, and was sentenced for life to New Caledonia. The general amnesty to political prisoners issued in 1880 released her, but she was again arrested in 1883 for leading in the organization of communists' assemblies, and was also imprisoned in 1886. She was editor for a time of the "Social Revolution," but later settled in London, where she published a novel, entitled "Les Microbes de la Societe."

MICHELET (mē-sh'lā'), **Jules**, noted historian, born in Paris, France, Aug. 21, 1798; died Feb. 9, 1874. He secured a liberal education at Paris, and in 1821 became professor of history in the College of Rollin, where he attained a reputation for close application and the publication of various historical works. Subsequent to the Revolution of 1830 he became the tutor of Princess Clementine and assistant to Guizot as a teacher of history at the Sorbonne. In 1838 he was chosen to teach history at the College of France, where he secured a professorship of moral philosophy. His teaching of moral precepts caused him to become involved in disputes with the Jesuits, against whom he published three separate books. During the revolution of 1848 he remained active in pursuit of literary research, but lost his position in the archives office by refusing to swear allegiance to Napoleon III. after the downfall of Louis Philippe. Michelet was uncompromisingly hostile to the Jesuits, advocated with great energy the republic, and issued many pamphlets and letters advocating civil and industrial emancipation. Some of his history is marked by undue prejudice, but there are chapters that excel both in spirit and composition, such, for instance, as he employs in writing of Joan of Arc. After the establishment of the republic of 1871, it became his ambition to complete his historical works by writing "A History of the Nineteenth Century," but he died at the time it was brought down to the battle of Waterloo. His most important writings include "History of France;" "History of the Revolution;" "Memoirs of Luther;" "History of the Roman Republic;" "Jesuits," and a number of works entitled "Mountains;" "Woman;" "Sea;" "Insects;" "Birds," and "Love."

MICHIGAN, a north-central state of the United States, which is situated north of Ohio and Indiana, and east of Wisconsin. It consists of two peninsulas, that are separated by the Straits of Mackinac. The southern peninsula is the larger, and is located between Lakes Erie, St. Clair, Huron, and Michigan, while the northern peninsula is situated between Lakes Superior, Huron, and Michigan. Its area is 58,915 square miles, practically the same in size as the two states of New York and Vermont. The coast lines include 1,625 miles, and 1,485 square miles of its area is water surface. There are upwards of 5,000 small lakes, the most important being Higgins, Hubbard, Torch, Houghton, Cheboygan, Burt's, Michigamme, Gogebic, and Otsego lakes. Among the inlets on its coast are Saginaw, Thunder, Grand Traverse, White Fish, Anchor, and Keweenaw bays.

The only rivers of importance in the upper peninsula include the Escanaba, Menominee, and Ontonagon; while those in the southern peninsula are more numerous and larger, including Muskegon, Manistee, Kalamazoo, St. Joseph, Chippewa, Au Sable, Flint, Grand, Huron, Shiawassee, and Raisin rivers. On the eastern boundary are the Detroit and St. Clair rivers, which connect Lake St. Clair with Lakes Huron and Erie, and separate Michigan from Ontario, while St. Mary's River forms a part of the eastern boundary of the northern peninsula. The southern peninsula has a rolling surface that rises gradually from the lakes and does not attain an elevation of over 600 feet, but the northern peninsula is more rugged and at various

points reaches altitudes of 1,415 feet above sea-level. Michigan has a cold climate, but is healthful and favorable to the production of a large variety of crops. Its summers are pleasant, and the winters quite severe. The average temperature at Lansing is about 46°, but it is much lower in the extreme north. Rainfall is abundant and well distributed, and in the winter there is a large snow-fall, averaging about three feet.

Michigan possesses an abundance of excellent timber, the varieties including oak, hickory, elm, walnut, maple, ash, basswood, cherry, pine, beech, and others useful in manufactures. The forests are well distributed, but are most abundant in the northwestern and northern portions. Wheat has long been the most important cereal, its average annual value being about $16,500,000. Other crops of importance are corn, $15,250,000; oats, $9,500,000; hay, $16,500,000; rye, $644,000; potatoes, $3,750,000; barley, $460,000. There is also an abundance of stock, including milk cows, other cattle, horses, mules, sheep, and swine. The mineral products are extensive, the state taking high rank in the production of iron ore, salt, copper, coal, fire-clay, limestone, sandstone, and gypsum, and yields small quantities of gold, silver, and lead. Its copper mines contain deposits of virgin copper and are counted the most valuable in the world. The manufactures embrace lumber products, flour, machinery, engines, boilers, furniture, agricultural implements, woolen goods, cigars, and various tobacco products. Its fresh-water fisheries are of vast importance, producing large yields of pickerel, sturgeon, lake and brook trout, whitefish, bass, grayling, and other varieties. Many of the fish are canned and salted for export. There is also a large production of fruits, including peaches, apples, cranberries, and many varieties of small fruits. Railroad lines penetrate all parts of the state, the total lines including 8,500 miles. The rivers furnish an abundance of water power, but they supply only a limited amount of navigation facilities. However, the state has excellent canals, notably the St. Clair Canal, constructed in 1871, and the St. Mary's Ship Canal, an important improvement on the St. Mary's River, and which has greater commercial activity than the Suez Canal of Africa.

Educationally the state of Michigan has attained to a high standing, its common and higher institutions of learning being alike thorough and popular. Close supervision of the public schools is maintained under a superintendent of public instruction. Primary, grammar, and high schools are abundant. Four normal schools are located at Ypsilanti, Mt. Pleasant, Marquette, and Kalamazoo. Among the higher institutions are the University of Michigan, Ann Arbor; Adrian College, Adrian; Albion College, Albion; Battle Creek College, Battle Creek; Detroit College, Detroit; Hope College, Holland; Alma College, Alma; Benzonia College, Benzonia; Hillsdale College, Hillsdale; Olivet College, Olivet; and Kalamazoo College, Kalamazoo. The state provides liberally for charitable and benevolent institutions, takes care of its criminal and incorrigible, and gives encouragement to development of skill in the industries. Scientific and religious associations of all classes are abundantly represented, and 850 periodicals are published, among them seventy-five dailies and 650 weeklies.

Michigan was formed from the Northwest Territory, and the region was first explored by the French in 1641. Father Marquette established a mission at Sault St. Marie in 1668. Detroit was founded in 1701. The French surrendered their claims to the English in 1763, and in 1783 it became a possession of the United States. It was not made a separate territory until in 1805, and in 1812 suffered by attacks of the English, who were later defeated by Commodore Perry. In 1837 it was admitted as a state, since which time it has made rapid growth in population and wealth. The state is divided into eighty-three counties and is popularly known as the Wolverine State. Lansing is the capital. Other important cities are Detroit, Bay City, Alpena, Ann Arbor, Grand Rapids, Battle Creek, Flint, Ishpeming, Kalamazoo, Jackson, Menominee, Muskegon, Manistee, Saginaw, Port Huron, and West Bay City. The census of 1904 accords it a population of 2,530,016. This embraces a total colored population of 22,419, or nine per cent., including 15,816 Negroes and 6,354 Indians.

MICHIGAN, Lake, one of the five great lakes of North America, third in size of the group, and the only one that is situated wholly within the United States. It separates the two peninsulas of Michigan and extends between the states of Michigan and Wisconsin, forming also a part of the boundary of Illinois and Indiana. Its length from north to south is 350 miles, average width sixty miles, and area 22,450 square miles. Its shores are low and sandy in many places. The principal inlets include Grand Traverse and Green bays, and the most important harbors are at Chicago, Milwaukee, Sheboygan, Michigan City, Muskegon, and Racine. Its greatest depth is about 1,000 feet, elevation above sea-level about 581 feet, and there are numerous lighthouses and important fisheries. Lake Michigan discharges into Lake Huron by the Strait of Mackinac, but some of the outflow is carried through the Chicago Drainage Canal into the Mississippi system.

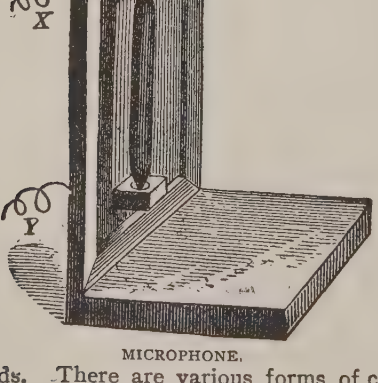
MICHIGAN, University of, an important educational institution at Ann Arbor, Michigan. It was founded in 1837 on a tract of land set apart by congress in 1826, and in 1842 was opened as a co-educational university. The institution has an efficient faculty of professors and instructors; extensive courses of study are maintained, and an average of 3,425 students attend, of whom

about 800 are women. It maintains departments of law, medicine, dentistry, engineering, sciences, classics, and for post-graduate work. The institution is well supplied with excellent buildings, has splendid apparatus, and a library of 160,000 volumes.

MICHIGAN CITY, a city of Laporte county, Indiana, located on Lake Michigan, about thirty-five miles southeast of Chicago. It is the only lakeport of Indiana, has a fine harbor, and extensive railroad connections. Among its industries are the manufacture of furniture, cigars, boots and shoes, lumber products, bicycles, railroad cars, and machinery. The city is provided with electric lights and street railways, has good schools, a public park, and is the seat of St. Marie's Academy. It is also the seat of a United States life-saving station and a state prison. The city has a large commercial trade. Population, 1900, 14,850.

MICKIEWICZ (mĭts-kyā'vĭch), **Adam**, Polish poet, born near Nowogrodek in the Russian government of Minsk, in 1798; died in Constantinople, Turkey, Nov. 27, 1855. He was educated in Wilna, and engaged exclusively in literature and as a teacher. His chief writings include "Lectures on Slavic Literature;" "Sonnets;" the epic "Wallenrod," and "Books of the Polish Nation." Several of his works have been widely translated.

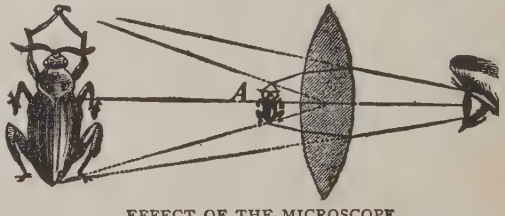
MICROPHONE (mī'krō-fōn), an instrument invented by Prof. Hughes in 1878, and which is used to increase the intensity of low



MICROPHONE.

sounds. There are various forms of construction, but the principle involved operates to the effect that faint sounds are carried to a more sonorous body, which emits a more audible sound. This is effected by placing a piece of charcoal between two blocks of carbon, to which the wires X and Y connect a Voltaic battery, and connection is made with a telephone. The slightest sound made on the wooden support of the charcoal is magnified enormously. To a person placing the ear-piece of the telephone to his ear the tread of a fly becomes as loud as the tramp of a horse, and the fall of tissue paper gives off a sound like the discharge of a gun. The ordinary carbon telephone transmitter depends on the principle of the microphone.

MICROSCOPE (mī'krō-skōp), an optical instrument designed to examine minute objects or parts of objects, and which so magnifies otherwise invisible or indistinct details that their structure or texture may be seen clearly. Simple forms of the microscope have been known from an early period, perhaps prior to the Christian era, but the

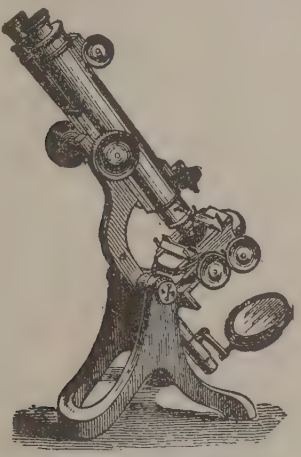


EFFECT OF THE MICROSCOPE.

more powerful compound microscope is thought to date from 1590, when Zacharias Jansen, a spectacle-maker at Middelburg, Holland, began their manufacture, and the first was brought to England in 1617 by Cornelius Drebbel, who came from Holland to serve as mathematician to James I. The principle involved consists of interposing between the eye and the object to be examined a magnifying lens, in the manner of a magnifying glass. There may be either a single lens or a number of lenses; though when the latter is the case the construction is such that they can be used as one or all in combination.

In a simple microscope the lens is formed of glass ground in such a way that when placed between the object to be examined and the eye it changes the direction of the rays of light, with the effect that more are brought to bear upon the object; thus it appears much larger than it really is. A compound microscope has a combination of lenses arranged so a magnified image of the object is projected by one lens in the manner of a magic lantern, and this image is further magnified by a second power, as in the simple microscope, thus producing results vastly more powerful. The first lens of a compound microscope is called the object-glass, or objective, and the second is known as the ocular, or eye-piece. The object-glass is the more important, and the shorter its focus the larger is the image produced. A monocular microscope presents an image to only one eye; a binocular microscope is constructed for the use of both eyes, and in the latter advantage is taken of several methods for dividing by prisms the pencils of rays from the objective, which diverge to eye-pieces properly placed. A solar microscope is one in which a lens con-

denses the sun's rays upon an object placed in its focus, and intense illumination causes the objective to project a greatly enlarged image. The electric microscope utilizes the rays from an electric light in a similar way,



BINOCULAR MICROSCOPE.

while the lucernal microscope employs a lamp to illuminate the object, and the oxy-hydrogen microscope employs the light from lime made incandescent by the oxy-hydrogen flame.

The first microscopes of a high character manufactured in the United States date from 1847. At present there are many periodicals and associations that are devoted exclusively to microscopic research. While the telescope has brought the heavenly bodies to us for examination, the microscope has enlarged and extended our vision so we may study myriads of forms in and about us that formerly were wholly unknown. The microscope is used in many fields of investigation. It has aided in the study of plants, minerals, and animals, and has made the achievements of Koch, Darwin, and Pasteur possible. With this instrument it is possible to magnify objects several thousand times. By the use of the most powerful instruments minute particles, equaling the one-millionth of an inch, can be seen.

MIDAS (mī'dăs), a wealthy king of ancient Phrygia, and who so pleased Dionysius by treating his friend Silenus with kindness that he offered to grant him any favor he chose to demand. The wealthy monarch, greedy for vast possessions, requested that everything he touched might turn to gold, whereupon Dionysius complied in so literal a sense that even his wine and food became changed into the metal. At last he prayed to be relieved from the fatal gift, and Dionysius, pitying his unhappy plight, directed him to bathe in the Pactolus River, a small stream of Lydia, in order to lose the power which had become the bane of his life. To these instructions Midas gave willing obedience, and was at once freed from the consequences of his avaricious demand. It is said that the Pactolus River has since been noted for containing grains of gold amid its sand.

MIDDLE AGES, a period of history also called Mediæval. It is considered generally to extend from the decline of the Roman Empire till the revival of letters in Europe, or as embracing the entire period of time between the ancient and modern civilizations. Some writers place the beginning of the period at the time of the invasion of France by Clovis in 486 A. D., and the end at the invasion of Naples by Charles VIII., in 1495. Others fix the beginning at the overthrow of the Western Roman Empire in 476 by Odoacer, and some writers at the time when Charlemagne became emperor of the West, in 800; while its end is placed by these writers at the close of the Reformation in Germany; the invention of printing; the discovery of America by Columbus, and the peace of Westphalia in 1648. Some writers also term this period the Dark Ages, and make it include the time between the classical literature of Greece and Rome and the literature of modern Germany, a period when learning was at its lowest ebb. Among the noteworthy incidents of interest occurring in the Middle Ages are the widespread establishment of the feudal system; the rise of the Roman Hierarchy; the Crusades; the development of German, Italian, and French nationalities; the Norman conquest of England, and the establishment of the Holy Roman (or German) Empire.

MIDDLEBORO (mĭd'l-bŭr-rō), a town of Plymouth county, Massachusetts, located nine miles east of Taunton. It is well connected by railroads, has good schools, and a public library of 10,000 volumes. There are manufactures of boots and shoes, woolen goods, lumber products, and straw goods. It has a growing trade in merchandise. Population, 1900, 6,885.

MIDDLESBROUGH (mĭd'dlz-b'rŭh), a city of England, situated in Yorkshire, near the mouth of the Tees River, about forty-five miles north of York. It is one of the modern cities of England, having been founded in 1829. Its prosperity dates from the discovery of immense deposits of iron ore in 1840. The city has a well improved harbor and modern municipal facilities, including pavements, gas and electric lights, and street railways. It has extensive manufactures of ironware, rails, engines, boilers, pottery, steamboats, clothing, chemicals, and tubes. The most important buildings include the custom-house, the public hall, the high school, and many fine churches. It is improved by several fine parks and a public library. Population, 176,380.

MIDDLETOWN, a city of Middlesex county, Connecticut, on the Connecticut River, about fifteen miles south of Hartford. The city has abundant railroad connections,

an extensive street railway system, electric lighting, pavements, and good public schools. It is also the seat of the Wesleyan University, an institution organized by Wilber Fisk in 1831, which has a library of 50,000 volumes. Other noteworthy institutions include the Berkeley Theological School, the state hospital for the insane, and a state industrial school for girls. The manufactures embrace flour, cotton and woolen goods, machinery, ironware, and clothing. Its commercial trade is facilitated by river navigation. Population, 1900, 9,589.

MIDDLETOWN, a city of Orange county, New York, situated twenty-two miles west of Newburg, and surrounded by a fine farming, dairying, and stock-raising country. The city has convenient railroad connections, making it important as a commercial center. It is supplied with good municipal facilities, including pavements and street railways. There are manufactures of jewelry, condensed milk, hardware, printers' supplies, hats, and clothing. It is the seat of the state homœopathic insane asylum, and contains a number of excellent schools. Population, 1900, 14,522.

MIDDLETOWN, a city of Ohio, in Butler county, thirty-two miles northeast of Cincinnati, and extensively connected by a number of important railroads. It has excellent public schools, paved streets, electric lights, a public library, and a number of fine churches. There is a growing trade in farm produce and merchandise. Its manufactures include tobacco, paper, flour, machinery, hardware, edged instruments, and utensils. The surrounding country is fertile, producing cereals and fruits. Population, 1900, 9,215.

MIDDLETOWN, a town of Dauphin county, Pennsylvania, on the Susquehanna River, about nine miles southeast of Harrisburg. It is surrounded by a farming and lumbering country, has manufactures of stoves, chemicals, furniture, furnaces, railroad cars, engines, and hardware. The city has electric lights and street railways, city waterworks, good schools, and is the seat of the Frey Orphan School. Population, 1900, 5,608.

MIDIANITES (mĭd'ĭ-ăn-ītes), an ancient race of Arabia, and according to Scripture the descendants of Midian, the son of Abraham by Keturah. They inhabited a large area near the Dead Sea, in Syria, their possessions extending from the plains of Moab to the Red Sea. Their trade with Egypt was extensive, especially in live-stock, cereals, and fruits. In the time of the Romans their mines possessed much value, and at present the country produces considerable petroleum. The Scriptures mention the Midianites as hostile to the Israelites. They were conquered by Gideon and worshiped Baal-Peor. The Midian sheik Jethro was the father-in-law of Moses, being a member of a Cushite tribe of the same name.

MIGNONETTE (mĭn-yŭn-ĕt'), a plant native to the northern part of Africa, but now widely naturalized and cultivated for its highly fragrant flowers. The leaves are wedge-shaped, the flowers whitish or greenish-yellow with fringed petals, and the seed-vessels open at the top. It is an annual, but in the country of its nativity it is a perennial. The name by which it is known is from the French and signifies "Little Darling."

MIGRATION (mī-grā'shŭn), a term applied to the act of migrating or removing from one region or country to another. Migration has been studied particularly in relation to the periodical movements of animals from one region to another. There are many genera and species of birds in all parts of the temperate zones that migrate at reasonably certain periods of the year to other parts, and most generally spend the winter in the warm regions of the tropics and the spring and summer in the temperate portions of higher latitudes. Some of the birds, as the swallows, ducks, geese, cranes, swans, and many others, migrate in large bodies, while others move singly toward the point of destination. It has been observed that most birds prefer to pursue their flight against the wind, some even resting during the flight while the atmospheric movements are unfavorable. Many fishes move periodically into streams and fresh-water bodies from the sea to deposit their eggs, and various classes of insects, such as the locusts, ants, and others change localities by flight or by moving in vast colonies. The migratory grasshoppers of the United States have been studied with interest, as well as those of Eurasia and Africa. Many of the mammals are inclined to migrate, as, for instance, the bisons of North America in an early period, but most species of mammals rather make incursions than periodical movements.

Some writers have accounted for migration on the basis of instinct, but others ascribe the phenomenon in birds to the search for food, which has become exaggerated by the power of flight. Likewise the migration of locusts is ascribed to hunger resulting from a lack of food in the vicinity long occupied, and the migration of fishes to a desire to deposit their spawn in favorable localities. In botany the term is applied to the tendency that feathery or downy seeds have to be carried by the wind, and in others to their transportation by streams and oceanic movements to regions far remote from the place of growth. Migrations of man have been directed chiefly by personal interest, and are governed largely by latitude, settlements being formed most generally in regions having a climate quite similar to those from which the emigration takes place.

MILAN (mĭ'lăn), an important city of Italy, on the Olona River, twenty-five miles south of Lake Coma. It is the capital of the province of Milan. The city is sur-

rounded by three walls, may be entered by twelve gates, and is now the most important railroad center of Lombardy. Its streets are broad, well paved, and lighted by electricity, and there is an extensive system of electric street railways. The city dates from remote antiquity. It possesses few ancient buildings, owing to successive wars, but there are several dating from the revival of learning that take high rank for beauty and architecture. The most prominent buildings are the duomo or cathedral, a Gothic structure, which ranks next to St. Peter's in Rome as the most excellent of Italy; the church of St. George; the church of St. Ambrose, founded in the 4th century; and St. Nazaro, a modern structure of great beauty. The La Scala theater has accommodation for 3,600 persons, and is the finest in the city.

Excellent works of art are in many of the public places and in the historic buildings, among them products by Mantegna, Titian, Vandyck, and Raphael. The Ambrosian library contains 175,000 volumes, and the national library at Milan has 190,000. There are also magnificent collections of engravings, paintings, and statues. In the city is an open space called the Piazza d'Armi, in which is an amphitheater having a seating capacity for 30,000 persons. It also has a number of excellent schools, hospitals, colleges, and universities. There are manufactures of cotton, silk, and woolen goods, boots and shoes, lace, jewelry, carpets, cheese, tobacco, porcelain, hats, velvets, ironware, machinery, and railroad cars. It is a center of banking, contains numerous scientific associations, and is the seat of large printing establishments.

Milan has an interesting history, authentic dates occurring as early as 222 B. C., when it was conquered by a Roman army. Roman occupation caused it to rise as a center of wealth, literary taste, and political influence, and in the 4th century A. D. Maximilian made it the residence of the imperial court. The Huns under Atilla sacked it in 452, and later it passed into possession of the Goths, Longobards, and Franks, and in 774 it became a part of the German Empire. It was the city where Charlemagne was crowned, and the place of coronation of the German emperors as kings of Italy. Milan was the head of the Lombard League in the 11th century. It was made the capital of Ghibellines' influence in 1395, and after 1545 the city passed successively to Spain, Austria, and France. Its fortune was that of various sovereigns and nations until in 1859, when the peace treaty of Villafranca annexed it and the whole of Lombardy to Piedmont. Population, 493,645.

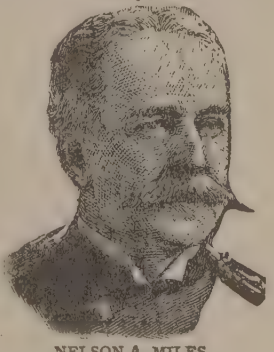
MILBURN (mĭl'burn), **William Henry**, clergyman, born in Philadelphia, Penn., Sept. 26, 1823. He had defective sight when a youth, but secured an education at Illinois College, and in 1843 was ordained a minister of the Methodist Church. He served as chaplain of the house of representatives at Washington a number of years, lectured with marked success in England in 1859, and became noted as an active and influential advocate of Methodism. Among many publications issued by him are "Ten Years of Preacher-Life;" "Rifle, Axe and Saddle-bags," and "Pioneers and People of the Mississippi Valley." He died April 10, 1903.

MILDEW, a class of fungi that attack many varieties of plants, embracing numerous species, and including many minute and sometimes microscopic parasitical forms. The different species of plants are attacked by their own peculiar parasites, but there are several kinds of fungi that infest the same plant. Mildew appears most frequently during weather unfavorable to plant growth. It is quite abundant on plants in a weakened condition, and also on fruits and clothing. The black mildew common to corn, the brown mildew found in the pear, and the destructive mildew injurious to the barberry are among the most harmful. Sulphur is an effectual preventive and destroying agency.

MILE, a measure of length used in the United States and many other countries. The statute mile fixed by Queen Elizabeth contains 5,280 feet and is used at present in this country and by Great Britain. The following table shows a comparison of the principal miles used in various countries:

United States and Great Britain statute mile	=1
Old Roman mile	=0.9193
Geographical or Nautical mile	=1.153
German mile	=4.611
German long mile	=5.753
German short mile	=3.897
Prussian mile	=4.680
Swedish mile	=6.648
Danish mile	=4.684
Scotch mile	=1.123
Irish mile	=1.273
Welsh mile	=about 4 English miles.

MILES, Nelson Appleton, soldier, born in Westminster, Mass., Aug. 8, 1839. He descended from a colonial family, studied in his native town and Boston, and at the beginning of the Civil War was commissioned first lieutenant of the 22d Massachusetts volunteers. He accompanied the army of the Potomac in practically every battle, rendered distinguished service in the battles of Williamsburg, Fair Oaks, Gaines's Mill, and Fredericksburg, where he was wounded, and later was carried off the battlefield at Chancellorsville with the supposition that his wounds would prove fatal. He



NELSON A. MILES.

recovered sufficiently to report for duty in 1863, and afterward served in the battle of the Wilderness, at Petersburg, and at Richmond, taking part until Lee's surrender near Appomattox in 1865. In the latter year he was made major-general of volunteers, and the following year became colonel of the 40th United States infantry. After 1865 he took an active part in many of the Indian fights on the border, rose rapidly in rank, and in 1890 became major-general. In 1894 he commanded the United States troops in the railroad strike at Chicago, and was made commander of the United States army by President Cleveland in 1895, being the first man to be raised to that position who had not graduated from West Point. In 1898 he planned and commanded the Porto Rican expedition in the Spanish War, and showed much efficiency in every department of the war in which he was engaged. He published several excellent works, among them "Personal Recollections" and "Military Europe."

MILETUS (mī-lē'tus), an ancient city of Asia Minor, situated in Ionia, on the Meander River. It is noted principally because of its extensive colonies in the Crimea, on the Black Sea, and other parts of Eurasia. Miletus had fully eighty different colonies, all of which contributed to the maintenance of a formidable fleet, and took an active part in military operations against the Lydian kings. In 494 B. C. the Persians under Cyrus conquered the city, and later it was captured by Darius and nearly ruined. It fell a prey to Alexander the Great, and its final ruin was accomplished by the Turks. During its prosperity it was noted as a center for the manufacture of woolen goods, furniture, and carpets, and because of its extensive trade. Miletus was the birthplace of Anaximander, Thales, and many other important personages.

MILFORD, a city of Worcester county, Massachusetts, seventeen miles southeast of Worcester. It has convenient railroad facilities, extensive street railway connections, and in its vicinity are valuable quarries of granite. There are excellent schools, paved streets, public lighting, and a library of 10,000 volumes. Among its manufactures are straw goods, boots and shoes, cement, ironware, machinery, elastic fabrics, and utensils. It has a considerable trade in merchandise. Population, 1900, 11,376.

MILITARY SCHOOLS, the institutions founded and maintained by states and countries for the purpose of training in the arts of war. This training is directed by instructors of recognized ability, and embraces courses in all phases of military interest, such as military engineering, strategy, and discipline. The most important military school of the United States is situated at West Point, known as the Military Academy of the United States. The Virginia Military Institute, located at Lexington, Virginia, was founded in 1839. It is the most notable military school maintained by a state, and ranks next to the United States Military Academy. The Kentucky Military Institute, at Farmdale, was founded in 1846. Military schools are maintained in a number of other states, especially in the southern states, and some flourish as private enterprises, as several located in Massachusetts, New York, and Pennsylvania. The United States government has forty detailed commissioned officers of the army for the purpose of instructing in military science and tactics at colleges and academies designated by the general government. Most of the states have introduced a military branch of instruction in some of their state institutions. Many private institutions of higher learning have followed the plan of establishing such instruction. At present about 10,000 persons take training in military science annually in the United States. Admission to military schools is generally limited to young men of excellent habits, physical perfection, and superior muscular skill. Schools for military training are maintained by all civilized countries, those of France, Germany, Austria, England, and Russia being particularly efficient. See **West Point.**

MILITIA (mĭ-lĭsh'ā), in the United States, a volunteer military force regularly trained, but not forming a part of the standing army. This force is spoken of usually as the national guard. It is subject to the call of the president, and serves to aid the executive to execute the laws, suppress insurrections, and repel invasions. All able-bodied male citizens who have attained to the age of eighteen years, and have not reached forty-five, are in a certain sense a standing militia; they are subject to military service under certain conditions. In most of the countries of Europe the militia constitutes a body of men who have served for a period of years, and who are members under compulsory requirements.

MILK, the whitish liquid secreted by the mammary glands of all female mammals for the nourishment of the young. It is an emulsion with a slight but pleasant odor and an agreeable, sweetish taste. Milk may be regarded a perfect food. It is consumed by the young mammal after birth, and enters largely into the food products essential to man. When subjected to microscopic examination, milk is found to consist of a clear fluid, in which minute globules are held suspended. Each of the globules appears as a separate body of oily matter enveloped by a thin coating of albumen. The globules rise toward the surface when the milk is at rest and form cream, the time required varying according to temperature. Under favorable circumstances about fourteen hours is required to accumulate practically all the cream. The milk may be agitated rapidly by churning, when the fat globules become broken and collect as butter in the form of

a pasty mass. The milk of all mammals contains the same constituents, but differs considerably in the proportion in which they are present in each kind. The following table contains an exhibit compiled by Charles A. Doremus:

VARIETIES.	WATER.	SOLIDS.	FAT.	CASEIN.	MILK-SUGAR.	ASH.	NITROGENIZED.	NON-NITROGENIZED.
Women	86.73	13.26	4.13	1.99	6.93	0.20	1.99	11.06
Cows	84.28	15.72	6.47	3.57	4.34	0.63	4.35	10.81
Goats	86.85	13.52	4.34	2.53	3.78	0.65	3.79	8.12
Ewes	83.30	16.60	6.05	7.73	3.96	0.68	5.73	10.01
Asses	89.01	10.99	1.85	3.57	5.05	....	3.57	6.90
Mares	90.45	9.55	1.31	2.53	5.42	0.29	2.53	6.73
Buffaloes	80.64	19.36	8.45	4.24	4.51	0.84	4.24	12.96
Camels	86.34	13.66	2.90	3.67	5.78	0.66	3.67	8.68
Sows	81.80	18.20	6.00	5.30	6.07	0.83	5.30	12.07
Hippopottami.	90.43	9.57	4.51	4.40	....	0.11	....	.....
Elephants	66.69	33.30	22.07	3.21	7.39	0.62	3.21	29.45

In the larger dairy farms it is customary to churn the milk, but on a smaller scale the cream is collected and churned for butter. For three or four days after birth the milk secreted by the mother is a yellowish fluid, has a strong alkaline reaction, possesses purgative qualities, and is called colustrum. Cheese is prepared by separating the casein into curds, which is done by coagulating the milk by a rennet or other agents, the rich character of the cheese depending upon the presence of large numbers of fatty globules. The thin fluid remaining after the milk has been coagulated is called whey, and the whitish deposits form the curd. Buttermilk results after churning and removing the butter. Both buttermilk and whey are used as pleasant drinks. The rennet used in coagulating milk is made from the fourth stomach of a calf. The principal adulterant of milk is water, which is added to increase its quantity, and frequently salt, sugar, carbonate of soda, and other substances are added for the purpose of preventing the milk from turning sour.

Cow's milk is practically the only kind utilized in the United States for making butter and cheese, and is also the class used for culinary purposes, but in many countries of Eurasia the milk of goats, ewes, camels, and buffaloes is used extensively. Condensed milk is secured by adding a small quantity of sugar and evaporating it in vacuum pans to about one-fourth its ordinary bulk. Reduction takes place rapidly under a temperature of 140°. The sugar used is the preservative, which keeps the condensed milk wholesome, the proportion being about one and one-fourth pounds to the quart of condensed milk produced, and in using it the consumer adds a quantity of water. The production of milk is a vast industry, as is also the daily supply furnished to large cities. In many of the states strict regulations have been provided whereby the consumer may feel assured that the cows producing the milk are in good health, and that it is supplied to them in a pure state.

MILKWEED, any plant of the genus asclepias, of the milkweed family, so called from the milky juice that exudes from a

COMMON MILKWEED.
Pod, Seeds imbricated on the placenta, Flower, Pollen Mass.

wound. There are many species, about forty being native to the United States. The seeds are clothed with a tuft of long silky hairs, which gives rise to the additional name of silkweed. In most species the flowers are white, orange, or purple in color. They are large and ornamental, and in some countries the milkweed is cultivated as a garden plant. Some species bear fibers used in making paper, others have silky tufts and are used with cotton in spinning, but most varieties are nothing more than obnoxious weeds growing in farm lands. The common milkweed is the most widely distributed in America.

MILKY WAY, or **Galaxy**, a great belt or zone of light stretching in a vast circle across the sky at an angle of about 63° to the equinoctial, and extending from one horizon to the other. The Milky Way arises from the blended light of countless stars which appear as a diffused light to the naked eye, but when viewed with a powerful telescope myriads of stars densely crowded together are observed. The stars are not distributed uniformly through its entire extent, and each is doubtless a sun of some system of planets. William Herschel estimated that 250,000 stars passed through the field of his great telescope in forty-one minutes, and with the powerful instruments now in use it is probable that many more can be seen. Other names applied to the Milky Way are Jacob's Ladder and the Way to St. James.

MILL, a machine for grinding grain so as to reduce it to flour or meal. The term is also applied to divers complicated machinery for treating various material so as to render it suitable for use in manufacture or for immediate consumption. Grain was ground originally by placing it between two flat stones and rubbing one over the other

roughly by hand. From this fundamental idea of a nether and upper stone used by hand came the building of all mills and devices for grinding grain, but at present the machinery used is such that the grain passes between rollers and is crushed by pressure. The different mills now employed in manufacturing are variously designated according to their particular purpose, as flour, meal, spinning, weaving, cider, coffee, cotton, oil, fulling, planing, saw, bark, lapidary's, and other mills.

MILL, John Stuart, author and statesman, born in London, England, May 20, 1806· died in Avignon France, May 9, 1873.

J. S. MILL.

His father, James Mill (1773-1836), is celebrated as a writer and philosopher, and took a studious interest in the early education of his son. The son was skilled as a Greek student at a very early age, went to France in 1820 for the purpose of learning the French language, and also studied political economy at Paris. In 1823 he became a clerk in a government office in London, was soon made head of the examiners' department, and opposed the transfer of India, in 1858, to the crown. He became a member of parliament in 1865 and acted with the liberals. From a very early period in life he was known as an acute thinker and prolific writer, contributing to a number of periodicals. He was principal manager of the "Westminster Record" for five years, beginning in 1835, edited the law work published by Jeremy Bentham (1748-1832) for a number of years, and wrote many excellent works on political economy and logic, a number of them still being standard text books. His publications include "System of Logic;" "Essays on Political Economy;" "Comte and Positivism;" "Subjection of Women;" "Principles of Political Economy;" "Thoughts on Parliamentary Reform;" "On Liberty;" "England and Ireland;" "Utilitarianism," and "Three Essays on Religion." He also made many addresses in favor of equality of legal and political rights of women.

MILLAIS (mĭl-lā'), **Sir John Everett**, painter, born in Southampton, England, June 8, 1829; died Aug. 13, 1896. He descended from an ancient Jersey family, spent his youth in the Channel Islands, and in 1840 became a student at the Royal Academy, where he displayed rare ability and exhibited a number of excellent productions. At the age of seventeen he exhibited his historical painting, "Pizarro Seizing the Inca of Peru," and in 1847 secured a gold medal for his "Tribe of Benjamin Seizing the Daughters of Shiloh." His productions are beautified by excellent coloring and refinement of taste. They are much admired because of the nearness in which they approach to nature. Among his most celebrated works are "Christ in the House of His Parents;" "Boyhood of Raleigh;" "Huguenot Lovers;" "Autumn Leaves;" "Over the Hills and Far Away;" "Black Brunswicker;" "Ferdinand Lured by Ariel;" "Woodman's Daughter;" "Veil of Rest," and "Ophelia." He also painted excellent portraits of such men as Gladstone, Tennyson, Carlyle, Salisbury, Bright, and Disraeli. In 1885 he was made a baronet, received the decoration of the Legion of Honor in 1878, and in 1896 succeeded Lord Leighton as president of the Royal Academy, but died the same year.

MILLER, Cincinnatus Heine, best known as Joaquin Miller, poet, born in the Wabash District, Indiana, Nov. 10, 1841. In 1854 he removed to Oregon with his parents, where he spent his early life among the pioneers and Indians. For about five years he lived with the Modoc Indians, began the study of law, and in 1863 entered the practice in Oregon. Subsequently he became judge of Grant county, Oregon, a position he held from 1866 until 1870. Several of his poems appeared while he was comparatively young. Later he edited the "Eugene Democratic Register," and published his first volume of poems in London, England, where he also assumed his pseudonymic name. His productions were favorably received by English critics, and he was thus encouraged to follow a literary career. Some of his novels have been dramatized, and have had successful presentation in various cities of Europe and America. Among his writings are "Songs of the Mexican Seas;" "Songs of the Sierras;" "Ship of the Desert;" "First Families of the Sierras;" "Songs of the Sun Lands;" "Songs of the Desert," and "The Danites."

MILLER, Hugh, author and geologist, born at Cromarty, Scotland, Oct. 10, 1802; died near Edinburgh, Dec. 26, 1856. He was largely self-educated, but studied also at the Cromarty grammar school, and during intervals was employed in the work of a stone-mason. He published several poems in 1829, became editor of the "Witness" at Edinburgh in 1840, and gave much attention to the study of geology. His writings are not only pleasing to the reader, but contain many beautiful and valuable statements of facts. Among them are "Poems Written at Leisure Hours;" "Legends of the North of Scotland;" "Old Red Sandstone;" "Footprints of the Creator," and "Story of My Education."

MILLET, a grass extensively cultivated in some sections of the United States for forage. There are numerous species, most of which bear stalks and leaves of value for feed in the green and dry state, and form

wholesome food products for cattle, sheep, horses, and mules. Millet was cultivated by the ancients in the earliest times as a cereal, the seed forming the portion for valuable food. Common millet has a strong stem, about two to four feet tall, and has a profusion of foliage. The seed is still used extensively for making flour and to be eaten as rice in Italy, Turkey, Arabia, China, Syria, and other countries of Eurasia. Millet seed is also of value as food for cage-birds. Some varieties are widely distributed as obnoxious weeds in crops. Among the cultivated varieties are the common millet, the sorghum millet, and the Hungarian millet, or Hungarian grass.

COMMON MILLET.
a and *b*, two views of the spikelet; *c* and *d*, two views of the "seed."

MILLET (mē-yā'), **Jean Francois**, celebrated painter, born in Gruchy, France, Oct. 4, 1814; died at Barbizon, near Paris, Jan. 20, 1875. He descended from a peasant family, spent the early part of his life as a farm laborer, but on account of his natural ability and taste for painting was sent to Cherbourg to study under Monchel. His rapid progress caused the authorities of the town to grant an annuity to assist in his studies, and he afterward took advanced work at Paris, where he exhibited specimens at the Salon in 1840. In order to support himself it was necessary to paint portraits and small pictures, and most of the time spent as a student he was sorely pressed by poverty. During the Revolution of 1848 he supported himself by portrait painting, but also rendered service at the barricades as a soldier, and in 1849 settled among the peasants of Barbizon, near the Fontainebleau forests, where he produced his marvelous works of beauty representing French peasant life. It is doubtful whether in the last century France produced a more original artist or one of greater skill. Several of his works were exhibited in the United States. His great work, entitled "The Angelus," sold at Paris in 1889 for $115,000. Other noteworthy productions include "Peasant Grafting;" "Sheep-Shearers;" "Shepherdess with her Flock;" "Women Carding;" "Sower;" "Gleaners," and "Waiting."

MILLS, Roger Q., statesman, born in Todd county, Kentucky, March 30, 1832. After securing an education and being admitted to the bar, he settled at Corsicana, Texas, to practice law. In 1859-60 he served as a member of the state legislature, and in 1872 was elected as a democrat to congress, in which position he served until 1892, when he was elected to the United States senate. He was chairman of the ways and means committee from 1887 to 1889, and drafted the Mills bill, which became a law and constituted a celebrated tariff revision.

MILLVILLE, a city of New Jersey, in Cumberland county, forty miles southeast of Philadelphia. It has a fine location on the Maurice River, is well connected by railways, and enjoys considerable trade and manufacturing. The manufactures include cotton goods, glass, machinery, and canned fruits. There are electric lights and street railways, fine public schools, numerous churches, pavements, and a public library. Population, 1900, 10,583.

MILO, or **Milon**, a Greek celebrated for great physical powers, born about 525 B. C. It is reputed that he was the champion wrestler and athlete at the Olympic games, and later also became a champion in the Pythian. After his various successful exploits, many challenges were extended to him, but none of his antagonists were able to meet him successfully in combat. It is recorded in the legends of Greece that after a successful contest he carried a live ox on his shoulders at the Olympic games; that later he saved the life of Pythagoras and his scholars by supporting a falling building, and that he was able to lift the iron gates of the city. The story is related that while endeavoring to pull a large tree apart his hands were caught in a split, and that wolves devoured him while held fast.

MILTIADES (mĭl-tī'a-deez), celebrated general of Athens, born in the latter part of the 6th century B. C. His skill and bravery led to his becoming the ruler of Chersonesus. Later he led a successful expedition against the Scythians, and, at the time Greece was invaded by the Persians, he was selected as one of the ten generals to resist the march into Attica. After deliberating whether the Grecians should venture a battle or defend the city from its walls, it was decided to take the former course, and, when Miltiades commanded the Grecian hosts, he gained a memorable battle on the field of Marathon in

490 B.C. Soon after he persuaded the Greeks to permit him to command an expedition against the Persians, for which purpose a fleet of seventy vessels was placed at his disposal, and he immediately followed up his victory by attacking the Persians on the island of Paros, but after a vigorous effort was repulsed with heavy losses and was severely wounded. The Athenians immediately impeached him, and placed a fine of fifty talents upon him. Being unadle to pay the fine, he was placed in prison, where he died shortly after of his wound. His son Cimon afterward paid the fine.

MILTIADES.

MILTON, a town of Massachusetts, in Norfolk county, about seven miles south of Boston. It is well connected by railroads and electric car lines, has extensive manufactures of rubber goods, paper, chocolate and leather, and is the residence of many Boston business men. There are excellent schools and fine pavements, and it is the seat of Milton Academy, an institution founded in 1798. The town has a number of excellent schools and a library of 15,000 volumes. Population, 1900, 6,576.

MILTON, a town of Northumberland county, Pennsylvania, on the Susquehanna River. It is well connected by railroads and by the Pennsylvania Canal. The manufactures embrace leather, machinery, hardware, textiles, railroad cars, and farming implements. It has good schools, pavements, and a public library. Population, 1900, 6,175.

MILTON, John, eminent poet, born in London, England, Dec. 9, 1608; died Nov. 8, 1674. He descended from a noted Protestant family, was trained to industry from early childhood, and in 1625 entered Cambridge, where he studied about seven years. It was his desire to become a minister, but the disturbed condition of the church at that time caused him to retire to Horton, where he remained six years, laboring industriously as a student and writer of classical literature, mathematics, music, and philosophy. In 1637 he made an extended visit to various European countries, including France, Germany, and Italy, and in the last named country met Galileo and other famous men. On returning to England he took an active interest in the political controversy between Charles I. and Scotland, and in 1639 settled at London to assist in the education of his two nephews, the sons of Mrs. Phillips, and also began to sketch his "Paradise Lost."

JOHN MILTON.

In 1643 Milton married the daughter of a royalist family, Mary Powell, but this lady soon found the austere home of the puritan cheerless and after a month returned to her father's home. Later she returned, and, after bearing three daughters, died in 1653. The execution of Charles I. in 1649 met the approval of Milton, who gave expression to his views in the pamphlet, "Tenure of Kings and Magistrates," and was rewarded by Cromwell by an appointment to the office of secretary of the commonwealth. This position he held with eminent distinction until the monarchy was restored, and, after Charles II. ascended the throne, Milton lived in concealment until pardoned by general amnesty. His eyesight began to fail rapidly, and in 1652 he became totally blind. Subsequently his works were dictated to Andrew Marvell and to his daughters, who were able to understand the Greek and Latin. In 1656 he married a second time, but his wife died fifteen months later, and in 1663 he entered for a third time into a marriage contract.

Milton's "Paradise Lost" was completed in 1663. This celebrated work was published in 1667, and by it Milton secured the reputation of being the greatest poet of his time. However, he was paid only $25 for the copyright, and a like amount at the sale of 1,300 copies of each edition. According to this contract he received three payments, and in 1681 his widow sold her rights to the work for $40. Other works published by Milton are "Paradise Regained;" "History of Britain to the Norman Conquest;" "Samson Agonistes;" "Treatises on Divorce;" "Treatise of Christian Doctrine;" "Tractate on Education," and "Treatises of Reformation." Milton was a stately poet. He came in possession of his powers at an early age, and his works have survived the centuries. His "Paradise Lost" has been read the most extensively. It has been translated into nearly all modern languages, and has gone through hundreds of editions. His life was largely disturbed by domestic and political differences until his third marriage, when he was enabled to live serenely amid his friends, and among books and music.

MILWAUKEE (mĭl-wa′kē), an important city of the United States, situated on Lake Michigan, in Milwaukee county, Wisconsin, about eighty-five miles north of Chicago. The Milwaukee River flows into Milwaukee Bay at the city, and by reason of it there is a splendid harbor, which is the seat

of important commercial activities. The railroad connections are extensive, thus facilitating a vast traffic by water and land to all points in the northern and western portions of the United States. There are excellent public schools, an industrial school for girls, a national soldiers' home, and a state normal school. The city is substantially built, and has excellent and well improved streets. Among its noted buildings are the custom-house and postoffice, Layton Art Gallery, city hall, several extensive depots, numerous churches, and many fine business blocks. Its street railway system extends to all portions of the city and many adjacent towns. It has a fine system of waterworks, several beautiful parks, numerous periodicals, and a number of important scientific and educational associations. The extensive manufacture of beer has made Milwaukee famous, the annual product being about 2,500,000 barrels. Among the other manufactures are boots and shoes, lumber products, vehicles, tobacco, leather, furniture, machinery, flour, ironware, scientific instruments, and clothing. The total capital represented by its manufactories aggregates $75,500,000, and there are 45,000 persons employed. As a stock, grain, and lumber market Milwaukee takes high rank. Nearly one-half of the population is German, which accounts for progressive developments in music and art. The first settlement at Milwaukee was made in 1835, and its growth has been continuous and rapid. It ranks fourteenth in population among the cities of the United States. Population, 1900, 285,315.

MIMICRY (mĭm′ĭk-rȳ), a term applied in botany and zoölogy to an imitative resemblance of one plant or animal to another, or to some inanimate object, for which it may be mistaken. However, the term is applied most extensively in the animal kingdom, and the phenomenon is thought to be entirely involuntary, depending particularly upon the conditions surrounding species of animal forms through many generations. This peculiar characteristic is one of the chief means of protection that some animals have, since they so nearly resemble the leaves or stalks of plants that their presence is not easily detected. In other cases the animals take advantage of this characteristic by quietly stealing upon their prey without being observed. Writers generally agree that mimicry occurs most commonly in animals which have been confined to the same country and practically to the same spot through many generations. Among the best examples of mimicry are those found in leaf-insects, the walking-stick, and many species of butterflies.

MIND, a term employed to designate the entire psychical being of man, and by virtue of which he is able to think, feel, and will. When used in this wide sense the different powers of the mind are divided into three general classes: the intellect, the sensibility, and the will. The intellect comprises those powers by which we are able to know; the sensibility is that group of powers by which we feel; and the will is the power to choose and execute. Man is made up of mind and matter. We are equally unable to know the real constituents of mind or matter, but it is possible to study both by their effects and their relations to each other. Although we know nothing of human minds disconnected from bodies, yet many writers hold that the mind is a real thing, and that it does exist after the body is dead. It is certain that the mind and body are closely related, and that manifestations purely mental, such as fear, joy, and anger, have a marked influence over the body; while vigorous health and disease have an equal influence in invigorating or weakening mental activity.

The science that investigates mental phenomena is called psychology, though sometimes it is spoken of as mental science, and also in a certain sense as metaphysics. Among the differences noted between mind and matter are that the former manifests itself only by its acts, while matter manifests itself only by its qualities. Matter never moves unless acted upon by some force, but mind originates its own activity. We cannot conceive of matter without realizing that it occupies space, while mind cannot be said to occupy space. Mind is also characterized by consciousness, but there is no evidence that consciousness is found in matter. Mind has the power to know its own acts, and it alone knows the qualities of matter. Some writers regard animal mind as imperfectly corresponding with that of man, while others think that the lower animals have a sensitiveness and sensation correlated with impulse and retentiveness, and that it is also modified by animal emotions and affections.

MINDANAO (mēn-dä-nä′ō), one of the largest of the Philippine Islands, and next in size to Luzon, being larger than the combined areas of New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. It is situated in the southern part of the Philippine Archipelago, is about 300 miles from north to south, and contains an area of 34,250 square miles. The general outline is irregular, the coast containing many important inlets, among them Sarangani, Illana, Iligan, Davao, Butuan, and Sibuguei bays. Large portions of the interior are mountainous, but there are fertile valleys and extensive coast plains. The volcano Apo is among the highest peaks, being 10,312 feet above sea-level. There are splendid forests of valuable timber, a diversity of mineral wealth, and several lakes, including Lakes Mindanao, Malanao, Ligauasan, and Kabatuan. Its products consist largely of lumber, live-stock, cotton, coffee, cocoa, tobacco, sisal, and many varieties of fruit. Formerly the Spaniards occupied the northern part, while the other por-

tions were under a sultan. The inhabitants consist largely of Malays, Chinese, Japanese, and a considerable per cent. of descendants from Spaniards. Zamboanga, Surigao, and Butuan are among the principal towns. According to the latest census it has a population of 117,903.

MINDORO (mēn-dō′rō), an important island of the Philippines. It is separated from Luzon by Verde Island Passage. Mindoro is about 115 miles long, fifty miles wide, and of volcanic origin. The coast line is quite regular, the surface mountainous, and the productions live-stock, rice, sisal, tobacco, cereals, cinnamon, and fruits. Mount Halcon has an elevation of 8,865 feet above sea-level. Calapan, situated on the north coast, is the capital town and principal seaport. It has excessive rainfall, a hot climate, splendid forests, and considerable mineral wealth. The population consists largely of Malays and Mongolians, and embraces 175,750.

MINERALOGY (mĭn′ĕr-ăl-ŏ-jў), the science that treats of minerals. The object of this branch of study is to point out the various means whereby to ascertain the chemical composition and the physical characters of inorganic substances; to classify them according to their specific relations; and to examine the manner in which they occur, together with substances associated with them, with a view of securing a comprehensive and systematic classification. Mineralogy is interested in treating of all inorganic substances found within the earth or on its surface. Geology treats of the constitution of the earth's crust and examines the history of the different strata or deposits, while mineralogy investigates the separate constituents found in the crust of the earth, and classifies their properties as separate constituents. It was known in comparatively early periods that simple and distinct minerals constitute the crust of the earth, but extended investigations were not made until in the 16th century.

Mineralogy is divided into various departments, including crystallology, and physical, chemical, determinative, descriptive, and economic mineralogy. Crystallology treats particularly of mineral crystallization; physical mineralogy, of the cohesive, elastic, optical, electric, lustrous, and other physical features of the different species; chemical mineralogy, of the chemical properties; determinative mineralogy, of the special crystallographic, physical, and chemical methods of distinguishing species; descriptive mineralogy, of the classification and description of species with their associative minerals and geographical distribution; and economic mineralogy, of the uses of minerals in the arts, as for jewelry and various purposes of manufacture.

Among the discoveries leading toward establishing well defined characters of minerals were those of Nicolas Steno, of Denmark, who, in 1669, announced that in crystals of quartz the angles of inclination of joining faces are constant, and that, even if the size varies, the number of faces and their groupings were always the same. The double-refracting property of Iceland-spar was observed in the same year. The Arabians had designated quartz as crystal, meaning clear ice, but Robert Boyle, in 1672, showed that it is more than twice as heavy as an equal bulk of water, and that ice is lighter than an equal bulk of that liquid. Among the discoveries of the 18th century are that the various shapes of crystals of the same product are intimately related; that ten forms of crystallization are the true primitive forms from which all others can be derived, and that there is a relationship in the structure of crystals between the secondary planes and the primitive form. Prof. Weiss, of Berlin, in 1809 announced the discovery of fundamental lines, which he called axes, and showed a relationship between the primitive forms and the secondary planes. His system includes four axial groups of crystallization. Later other systems of crystallization were worked out by the use of the reflective goniometer, an instrument employed to measure the angles between the faces of crystals.

The intimate relation that exists between the cleavage form of a mineral and its action upon light was pointed out in 1819 by Brewster, and, accordingly, he made a classification of crystals on optical grounds, which agrees with that of Weiss with the exception of two of the systems. From these discoveries the present six natural systems of crystallization generally recognized by writers were established, and these are held to include all possible crystal forms. Early in the study of mineralogy the classification was divided into earths, stones, and metals, and Werner in 1817 classified the different minerals as earthy, saline, combustible, and metallic. There is still much diversity of opinion as to the causes that produce minerals of different grades of hardness, but always after their own crystallized form, and also in the classification of the minerals as to their different properties. Among the various characteristics that have led to the different classifications may be named luster, the light reflected from the surface; streak, the appearance of a furrow when cut by a hard instrument; fracture, the peculiarity of the surface when freshly broken; and hardness, the resistance when it is attempted to cut or scratch the mineral. Mohs, a German mineralogist, orginated a scale by which the various minerals were graded as to hardness from one to ten. A representative exhibit according to this scale may be given as follows: 1, talc; 2, gypsum; 3, calcite; 4, fluorspar; 5, apatite; 6, potash feldspar; 7, quartz; 8, topaz; 9, corundum; 10, diamond. When seeking to classify a mineral as to hardness, the experimenter will ascertain which of the above it will scratch. A min-

eral that will scratch quartz but not topaz, while it may be scratched by the latter, is classified in relation to hardness between 7 and 8.

Pseudomorphism is a peculiarity that occurs in nature from alteration through chemical change, as by loss, addition, or exchange of constituents. In that case the mineral is called a pseudomorph, and possesses the external crystalline form of another mineral. It also occurs by molecular change; by substitution, either partial or total, as when the original crystal is dissolved out and the cavity filled by other material; and also by superficial incrustation. The hardness is often different, the luster absent or dull, and the weight unlike that of the mineral simulated in form. Among the examples of pseudomorphism may be named petrified wood, formed by infiltrating the wood with water containing silicic acid, and, as the wood was dissolved away, the silica was substituted; also in cases where animal forms became buried and their molds were later filled by a mineral taking on the form common to the peculiar animal covered by the deposits. The list of famous mineralogists includes Mohs, Werner, Hauy, Agricola, Cronstedt, and Dana. The last named writer is considered authoritative in the determinative mineralogy of America.

MINERAL WATER, a designation applied to the water of springs and wells that contain in solution an unusual proportion of sulphur, iron, sodium, magnesia, carbonic acid, etc. Mineral waters usually result from subterranean currents passing over deposits of iron, salt-rock, sulphur, alkaline, and other mineral substances, thus dissolving and carrying with them a certain per cent. of mineral matter.

MINERVA (mĭ-nĕr'vȧ), the Roman goddess representing wisdom, and identified with the Pallas-Athene of the Greeks. She is represented as the daughter of Jupiter, and was regarded the patroness of learning and of useful arts. Schools were under her especial care. To her were ascribed the invention of musical instruments, and accomplishments in spinning, weaving, sewing, and other household arts. She also protected warriors in battle. Her aid was implored by physicians, painters, and teachers. In statuary she was represented with a spindle, spool, and needle. The only three divinities worshiped in the Roman capital were Jupiter, Juno, and Minerva, and in their joint honor the ludi maximi, or great games, were held. The Minerval festivals occurred from the 19th to the 23d of March.

MINING, the art of conducting operations by which useful minerals are obtained from the earth's crust. The art of securing metals or minerals of economic value either from above or underground has been practiced from remote antiquity. It is thought that turquoise mines existed in the peninsula of Sinai as early as 3,000 B. C. Tubal Cain is mentioned in Genesis as "an instructor of every artificer of brass and iron," and Job refers to mining and metallurgy. In the museum at Turin, Italy, is an Egyptian papyrus dating from 1400 B. C. in which a plan of gold mining is depicted. The Phœnicians are mentioned by Herodotus as being engaged extensively in mining in the mountains of the island of Thaso. They also operated in other regions and carried on a large trade in tin and lead. The Romans conducted extensive silver mining at Almaden, Spain, while they had possession of that portion of the Iberian peninsula. They also had extensive mining interests in Britain, of which evidences still remain. Georgius Agricola, a Latin writer, published the first exhaustive treatise on mining in 1556. In 1620 gunpowder was introduced for blasting rock, which was soon followed by a complete revolution in the art of conducting mining for different minerals. The steam engine began to be employed in the 18th century, and in 1815 the Davy lamp was invented, which has been of immeasurable utility in coal mines. Subsequently the methods of conducting the art as well as many new forms of useful machinery came into common use.

Mineral deposits occur in various forms, but they are usually classified under the two divisions known as seams or strata, and lodes or veins. The seams occur principally in horizontal deposits, as coal, iron ore, and salt, and they are parallel to the stratified rocks that are immediately below and above. Seams occurring in a nearly perpendicular form are due most generally to disturbances by earthquakes or volcanic action, the strata being thereby disturbed and set up more or less vertically. Lodes comprise mineral matter that was in a molten state and by internal pressure oozed out and completely filled a fissure that existed in the crust of the earth, gold and silver deposits often occurring in this manner. There are various methods of prospecting for minerals, though it is certain that many of the rich veins and seams were discovered by mere accident. Gold was found in California by cutting a mill-race, and in Hungary by accidentally observing a bird picking up shining particles. However, there are localities in which the minerals project at the surface, and in that case there is little difficulty in beginning operations. This is true particularly of coal, which is often found projecting at hillsides, and also of gold and silver lodes, but in the latter form the portions near the surface are not productive and extensive excavations need to be made to ascertain the general value of the lode to be developed. Where mineral deposits exist far below the surface, as is the case in coal and other deposits, it usually is deemed advisable to do prospective boring for the purpose of ascertaining the value and depth of the

deposits; determining whether there are extensive water-bearing strata, and ascertaining whether the strata of rock immediately above the deposits will constitute a safe and durable roof.

In prospecting it is found profitable to use a diamond drill, and the operator keeps a careful memoranda of the exact composition of the various formations through which the drill passes. If paying quantities of mineral deposit and suitable conditions are found to exist, a trial shaft is sunk down to the depth at which the minerals are found. In excavating it is often necessary to employ powerful explosives for the purpose of penetrating through rocks, which is usually the case in most mines, particularly where it is sought to develop lodes. Shafts are commonly sunk through one or many hundred feet of valueless formations before reaching the mineral deposits. The method depends entirely upon the formation to be penetrated, but there is usually a plan of hoisting the loosened particles by horse or steam power. In such cases devices are used for properly ventilating the particular place occupied by the workmen, and safeguards are employed against an influx of excessive quantities of water. The latter is usually effected by water-tight boxes, but in larger enterprises by artificially freezing the water-bearing strata. The whole subject of mining is divided into four lines of study: mining geology, mining engineering, metallurgy, and mechanical engineering.

Mining is more or less a dangerous and unhealthful occupation, but with modern methods of performing the labor and ventilating the various departments of the mine it has become much more wholesome and agreeable. There are usually two different methods of operating, especially in coal mining. The one is known as the pillar and room method, in which the roof is sustained largely by pillars of coal left for that purpose; while in the long-wall method, sustaining pillars of coal are left only near the shaft, and farther back the roof is sustained temporarily by props of wood, but later these are removed and it is allowed to settle down consecutively as the miners excavate the coal. Long-wall mining is by far superior in all cases where the conditions are favorable, since the settling roof causes the coal to break down as soon as it is undermined by the laborer or by a machine, and it is also possible to utilize practically the entire deposit. Where the pillar and room method is employed the roof is borne up by pillars and wooden props, and in some cases it is possible to remove the pillars before abandoning the works, but often much of these are lost, and it is also necessary to expend more for the purpose of blasting the coal. The different waste materials are generally used to fill the portions from which the coal has been removed. The methods of operating in veins bearing metals are quite different from those common in coal mines, since the deposits are found most frequently in lodes running slightly inclined from the vertical, or occur in deposits of great thickness.

The size and depth of collieries differ greatly, as do also the methods of securing the ores, but it is generally aimed to utilize all the parts bearing sufficient value to be stamped and smelted, while the portions representing a value not sufficiently profitable are made use of, at least in some cases, for filling in excavated portions. Drills propelled by compressed air, steam, or electricity are used extensively, but in the smaller mines hand-drilling is universal. When the drill holes have been properly made, the explosives are placed in, connected by fuse, and the opening is properly tamped by clay or some other agency. After all the necessary matters have been adjusted, the fuse is lighted, and the laborer steps to a place of safety until the explosion occurs. The amount loosened by a single explosion depends entirely upon the kind of mineral, its thickness, and the manner in which the explosive has been applied. Among the different agencies employed are blasting powder—which is still used largely in coal mines—gunpowder, gun-cotton, dynamite, and nitrated gun-cotton. In some mines electricity is utilized to fire the charge. As above stated, many of the mines are operated with the level of the surface, or even some distance above the lower part of a hill, but the largest amount of mining is done far below the surface. A silver-lead mine at Przibram, Bohemia, has a depth of 3,435 feet, and was long the deepest shaft in the world. The Calumet copper mine in the Lake Superior region of Michigan is 3,900 feet deep, and one in Prussia is 5,830 feet deep. The vast expense in building a shaft of great depth makes it necessary to hoist a large quantity of mineral products at one opening, but this is accomplished readily by use of modern hoisting machinery especially adapted for deep-mine working, the speed in many of them ranging from 3,500 to 5,000 feet per minute. There also have been vast improvements in mine drainage; the use of compressed air and electricity; machinery for ventilation, and the treatment of ore products after they are brought to the surface.

The mining industry of the world is of vast importance, adding largely to the wealth of nations annually and employing millions of workmen. Many of the leading countries of the world support schools and institutions devoted to disseminating knowledge of mining, thus placing the industry on a high and recognized basis of efficiency. Powerful labor unions also have tended to bring the workmen in connection with each other as sympathetic coöperators, and thereby to increase their efficiency and knowledge of economic questions. The mining industry of the United States is of grow-

ing importance and yields vast quantities of all important minerals. The values of the principal minerals produced annually in this country are as follows: bituminous coal, $215,500,000; pig-iron, $120,500,000; anthracite coal, $98,500,000; silver, $75,250,000; gold, $65,500,000; copper, $65,250,000; petroleum, $45,500,000; stone, $38,500,000; lead, $17,500,000; natural gas, $6,500,000; zinc, $11,500,000; brick clay, $10,250,000; cement, $10,250,000; mineral waters, $9,500,000; salt, $7,125,000; phosphate rock, $3,875,000; limestone for iron flux, $2,875,000; zinc white, $2,625,000; aluminum, $2,225,000; quicksilver, $1,250,000; and borax, $1,225,000.

The minerals found on lands in the United States belonging to individuals are owned exclusively by the parties holding titles, but lands known to be mineral, and whose title is still in the United States, may be preempted only by persons actually operating, for a nominal fee. In many of the foreign countries all mineral titles are vested in the government, but in others absolute titles are given. Usually the quantity of mineral land that may be held is limited to a small tract, while certain rights are given to follow veins that lead into the possession of a neighboring claimant. In 1847-48 much excitement was occasioned by the discovery of vast gold fields in California. This was true also of Alaska, where valuable discoveries were made in 1897. The leading schools of mining in the United States include Stevens Institute of Technology at Hoboken, New Jersey; Sheffield School in Yale University; and School of Mines, in Columbia College, New York City.

MINK, the common name of several species of fur-bearing quadrupeds, allied to the polecat. Several species are native to

AMERICAN MINK.

America and Eurasia. The fur is a beautiful chestnut-brown, the tail bushy, and the body stouter than that of the weasel. It is from fifteen to eighteen inches long, including the tail, which is about nine inches. Minks have well developed scent-glands, and the secretion is almost as offensive as that of the skunk. The common American mink is found chiefly along ponds and streams, where it pursues a semi-aquatic life and preys upon fishes, crawfishes, frogs, and small mammals. It is hunted for its fur. Minks are commonly caught in traps, but some species have a rare intelligence in avoiding capture.

MINNEAPOLIS (mĭn-ē-ăp'ō-lĭs), a city of the United States, county seat of Hennepin county, Minnesota, at the falls of St. Anthony, on the Mississippi River, immediately northwest of St. Paul. Its eastern limits coincide with those of St. Paul, with which it is connected by railway and electric car lines, and the intervening space is occupied chiefly by gardens and residences so as to constitute practically one city. The two cities are popularly called the Twin Cities. Its streets are beautifully improved by pavements, public lighting, city waterworks, and many handsome buildings. The most noted structures include the county courthouse, the chamber of commerce, lumbermen's exchange, exposition building, postoffice, and numerous churches. There are fine public schools, a number of excellent parks, and it is the seat of the State University, Augsburg Seminary, Hamline University, Macalester College, and several seminaries and hospitals. The falls of St. Anthony have a descent of sixteen feet, and propel the finest flouring mills in the world. Its excellent water power was in fact the basis for the building of the city, and there are now splendid elevators and a large trade in flour with all parts of the world. The annual receipts of wheat average 42,500,000 bushels, and besides it there is a large trade in oats, barley, live-stock, and lumber. Among the general manufactures are machinery, clothing, canned goods, furniture, scientific instruments, tobacco, and utensils. Minneapolis has a healthful climate, and in its vicinity are numerous beautiful lakes, which afford splendid summer resorts with fine bathing and fishing facilities. The city is not only the largest in Minnesota and the northwest, but is of vast importance as a trade, educational, and intellectual center. In size it ranks as the nineteenth city of the United States. Population, 1900, 202,718.

MINNEHAHA (mĭn-e-hä'hä), a stream forming the outlet of Minnetonka and other lakes of Minnesota, and flowing into the Mississippi between St. Paul and Minneapolis. On this stream are the celebrated falls of Minnehaha, which constitute a sparkling fall of water from a height of fifty-eight feet, and form a favorite resort for tourists. Longfellow applies the name Minnehaha to the principal female character of his "Song of Hiawatha."

MINNESANGERS, the German name for a class of poets who were popular in the higher grades of society from 1138 till 1347. They were so named from the Old German, the name meaning remembrance and singers. It was their custom to write poetry and compose music devoted to love and devotion, and to visit the different castles and courts of princes and nobles. Fully 175

different writers are represented in the productions of this period that are still extant. They include the excellent works from which Wagner drew inspiration in writing his compositions, among them being the "Nibelungenlied" and "Lohengrin," and also the famous "Wachtlieder," in which splendid romances of praise and watch incidents are recited. After their decline came the Meistersangers, an order of men belonging to the artisan class, who formed guilds by binding themselves to observe certain arbitrary laws of rhythm. Nuremberg became the center of their guilds, whence they spread rapidly to all German-speaking countries, and the last of their guilds at Ulm was not discontinued until 1839. Their poetry was largely lyrical and was sung to music. The most celebrated of the guild was Hans Sachs, who composed 4,275 songs.

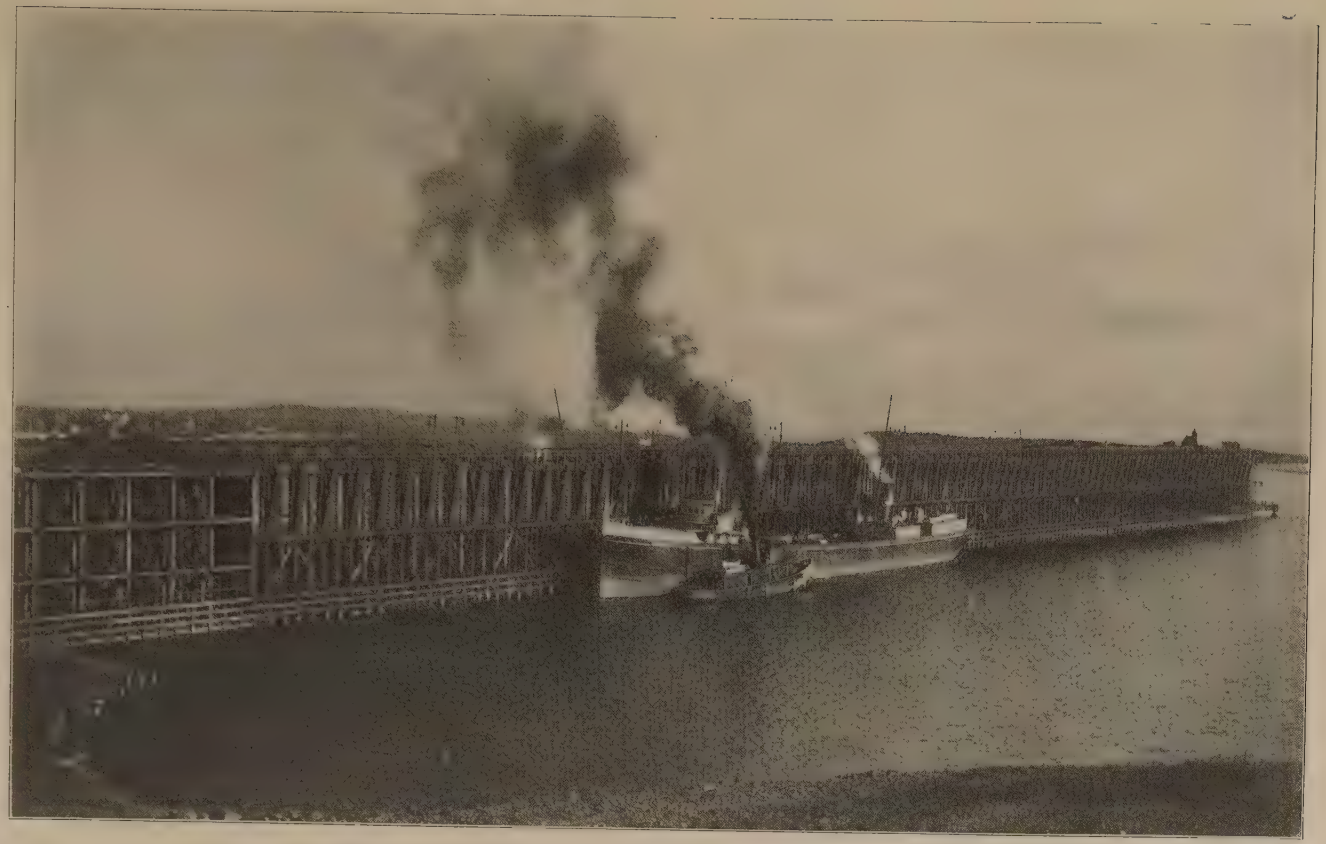
MINNESOTA (mĭn-ę-sō'tą), a river of Minnesota, which has its source near Lake Traverse, then widens into Big Stone Lake, a sheet of water about thirty miles long. It next flows from that lake, passes Ortonville in a southeast direction, makes a bold curve near Mankato, and thence flows northeast into the Mississippi River near St. Paul. The Minnesota has a total length of 460 miles. It is navigable about one-fourth of its course, and flows through a region possessing much agricultural wealth.

MINNESOTA, a north-central state of the United States, the most northerly of the Union. It is bounded on the north by the Dominion of Canada, east by Lake Superior and Wisconsin, south by Iowa, and west by North and South Dakota. Its total area is 83,365 square miles, an extent about the same as the combined areas of North and South Carolina. The surface is generally an undulating plain with an average elevation of about 990 feet above sea-level. Along the rivers and streams are rolling lands, which possess fine belts of timber, but practically all of the soil is fertile. The drainage is generally toward the southeast, but toward the northern portion is the divide that separates the water basin of the Mississippi from that of the Nelson River. Among the principal rivers belonging to the Mississippi system are the Mississippi, St. Croix, Des Moines, Big Cottonwood, Minnesota, and Pome de Terre. Those flowing into the Dominion of Canada include the Red River of the North, Rainy Lake, and their tributaries, while the St. Louis River flows into Lake Superior. The state has the largest lake surface in the Union, the total being 4,160 square miles, which includes thousands of beautiful sheets of water. Among the principal lakes are Mille Lacs, Red, Leech, Otter Tail, Winnibigoshish, Vermillion, and Big Stone lakes. On the northern boundary are Lake of the Woods and Rainy Lake. The climate is continental, but remarkably healthful. It has an average annual temperature of about 48° in the north-central part. The rainfall is abundant for all classes of crops; the summers are warm, but the nights generally cool and refreshing.

Since the soil and climate of Minnesota are alike favorable to the growing of cereals, it takes a high rank in the production of a number of products. The annual value of wheat is $40,500,000; oats, $12,125,000; corn, $8,500,000; hay, $12,250,000; barley, $3,125,000; potatoes, $2,950,000; and rye, $1,250,000. It represents large interests in the rearing of cattle, horses, milk cows, mules, sheep, and swine. Its dairy products, both in quantity and quality, rank among the first. The northern portion of the state contains valuable forests of spruce, beech, pine, elm, oak, maple, walnut, and other trees, while belts of timber skirt the streams, and the prairies produce an excellent quality of valuable grasses. Mining is an important industry, the principal products being iron ore, copper, granite, slate, red pipe-stone, and a small output of gold. Though iron mining has been carried on only about twenty years, the state has taken first rank in the output of that product.

The manufactures have been facilitated largely by reason of vast water power, and on account of the state lying within shipping distance of the productive bituminous coal regions of Iowa. Flour and lumber are the principal manufactures, but there are also increasing quantities of tobacco products, spirituous liquors, furniture, machinery, ironware, earthenware, canned and packed goods, farming implements, and stoneware. A complete network of railroads penetrates the principal portions of the state, representing a total of 7,500 miles. Besides these are excellent transportation facilities by the Mississippi and Minnesota rivers and Lake Superior. Duluth is the principal lakeport, and from it an immense steamboat traffic is conducted by means of the Great Lakes with the Atlantic Ocean. Minneapolis and St. Paul constitute the great railroad center of the state, and the two combined furnish a growing competition in trade and manufacture with Chicago.

Minnesota takes a high rank educationally, its school system being liberally supported by a public fund created from the sale of lands and by general taxation. There are common schools in all sections of the state; well articulated high schools in the towns and cities, and efficient institutions of higher learning supported by state taxation. The state maintains normal schools at Mankato, Winona, Duluth, Moorhead, and St. Cloud. It has excellent benevolent and reformatory institutions. The State University is at Minneapolis. This institution was founded in 1851. It is open to the free attendance of both sexes, has four confederated colleges, a library of 60,000 volumes, and is attended by 3,900 students. Among the many excellent denominational institu-



IRON ORE DOCK, No. 5, TWO HARBORS, MINN.

Two Harbors, Minn., is the largest shipping port of iron ore in the world. In 1903 the port was entered by 2,150 vessels, and about 6,000,000 tons of iron ore were shipped. In 1900 its population was 3,278, and in 1903 it was over 5,000.

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tions of learning may be named the Augsburg Seminary, Minneapolis; Gustavus Adolphus College, St. Peter; St. Paul's College, St. Paul; St. Olaf College, Northfield; Hamline University, Hamline; Southern Minnesota Normal School, Austin; St. John's University, Collegeville; Parker College, Winnebago City, and Carleton College, Northfield. The various religious organizations are well represented, of which the Lutherans are the most numerous. Next in numerical order are the Methodists, Catholics, Presbyterians, Episcopalians, Baptists, and Congregationalists. The state has a large number of scientific and educational associations and 690 periodicals, of which forty are issued daily and 550 weekly.

Minnesota was formed partly from the Northwest Territory and partly from the Louisiana Purchase. The region was first visited by French traders and priests in 1659. Duluth visited the territory in 1678, and Hennepin discovered the falls of St. Anthony two years later. The northeastern part was ceded by France to England in 1763, and to the United States in 1783, and the remainder was secured in 1803. The first settlement was at Fort Snelling, near the mouth of the Minnesota River, in 1821. Other settlements followed soon after at St. Paul and Stillwater. The Chippewa Indians surrendered the lands east of the Mississippi River in 1837, and in 1849 it was organized as a territory, but included the northern territory of the Dakotas. Later it became a part of the territory of Missouri and afterward of Iowa, and in 1858 was admitted as a state. The Sioux Indians raised a formidable revolt in 1862, when about 800 persons were killed. Within the last several decades the state has made remarkably progressive strides in education and industries, and is increasing rapidly in wealth. It has been popularly named the Gopher State. St. Paul is the capital. Other cities are Minneapolis, Duluth, Winona, Stillwater, Mankato, St. Cloud, Red Wing, Faribault, and Brainerd. Population, 1900, 1,751,394. This includes a total colored population of 14,358, of which 4,959 are Negroes and 9,182 Indians.

MINNOW, a class of fish allied to the carp, and found abundantly in the streams of America and Eurasia. They are common in the same streams with trout, swim in schools, and prefer gravelly bottoms. Most species have an average length of three inches, but some attain fully five inches. They are caught easily in hand-nets for the purpose of serving as bait in catching other fish. In some regions minnows are known as pink and also as the minim. The common minnows have a brown color, a protractile mouth, and small transverse bands of a darker shade of brown along the sides.

MINORCA (mĭ-nôr'kȧ), one of the Balearic Islands, in the Mediterranean Sea. It is second in size only to Majorca, and is situated about twenty-five miles northeast of the latter. Minorca has a length of thirty miles, is ten miles in width, and contains an area of 275 square miles. The coast is rocky and precipitous, and the interior has a number of mountains. Mount El Toro is the highest peak, elevation 4,985 feet. The island is productive, yielding flax, wheat, hemp, wine, copper, lead, iron, live-stock, marble, and tropical fruits. Ciudadella and Point Mahon are the principal towns. Minorca has belonged to Spain since 1802. Population, 39,675.

MINOR PROPHETS, the twelve prophets of the Old Testament that are so named from the brevity of their writings, and whose prophecies are recorded in the Hebrew canon. These prophets are Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah, and Malachi.

MINOS (mī'nŏs), a personage mentioned in Greek mythology as a ruler of Crete, the son of Zeus and Europa, and brother of Æacus and Rhadamanthus. His reign became celebrated on account of its justice and moderation. After death he was created one of the judges of the lower world, which office he held in conjunction with one of his brothers.

MINOTAUR (mĭn'ŏ-tȧr), a fabled monster described in Greek mythology as an individual having the body of a man and the head of a bull. He was made captive by Minos in the wonderful labyrinth constructed by Dædalus for the Cretan king. His imprisonment was brought about because he fed on human flesh, and while there was fed by criminals, but later youths and maidens were sent as tribute from Athens. Subsequently he was slain by Theseus and Ariadne.

MINSK, a city of Russia, capital of the government of Minsk, 110 miles southeast of Wilna. It is situated conveniently on a number of important railroads. The Svislotch, a tributary of the Beresina, flows through the city. Its streets are improved by modern facilities, including pavements, waterworks, and street railways. Many of the buildings are of handsome stone. It is the seat of a fine public school system, several cathedrals, and higher institutions of educational arts. Minsk has manufactures of cotton and woolen goods, machinery and leather, and a growing commercial trade. Population, 72,318.

MINT, any one of several aromatic herbs of the mint family. They include many varieties, such as peppermint, useful in medicine as a stimulant; spearmint, used in cooking; and horsemint, mountain-mint, and catmint. Most of the different varieties are perennial. They are distributed widely in temperate regions, have square stems, simple and opposite leaves, and yield an essential oil. The flowers consist of whorls or circles grouped together, are purple or red in color, and possess a peculiar odor. Peppermint is especially valuable, and is used extensively in flavoring confectionery.

MINT, an institution for coining money, and from which it is issued by public or sovereign authority. In early times the coins were made by cutting pieces of metal and hammering them into shape, but in the 16th century it became common to coin both gold and silver by melting, and, after mixing with it copper alloys, to cast it into molds of proper form. Antoine Brucher, a French engraver, was the inventor of the first machine similar to those now in use. The process involves mixing copper alloy to supply sufficient hardness to the gold or silver, which is done by melting the metals, and afterward these are cast into bars. The bars are next rolled to form sheets of proper thickness, and from these the coins are cut. If, on weighing, the coins are too heavy, small strips are cut from the edges, but, if too light, they are remelted and again rolled. The result after cutting is a blank coin, which is next taken to the milling machines, where the rim is completed, and afterward the figures and letters of the different coins are stamped on with the coining-press. The finished coin is carefully inspected and weighed, and, if found in strict accord with coinage requirements, it is placed with others of the same denomination in bags and stored in vaults until put into circulation.

The first mint in the United States was established at Philadelphia under a national coinage act passed in 1792. At first the metal and machinery employed were imported. Copper money was coined at this mint as early as 1792-93, silver money in 1794, and gold money in 1795. Steam power was introduced in the coinage of money in 1816, and soon after branch offices were established at different places, both for assaying and coining metals. At present there are mints at Philadelphia, New Orleans, San Francisco, Carson City, and Denver, all of which are under the charge of the bureau of the mint of the United States treasury department. The two last named are really assay offices, and the one at Philadelphia is the most important, where the dies for all the mints are made. Assay offices have been established in various cities. Their purpose is to receive deposits of gold and silver, which are formed into bars and stamped with their weight and proportion of the metals, and returned to the depositor.

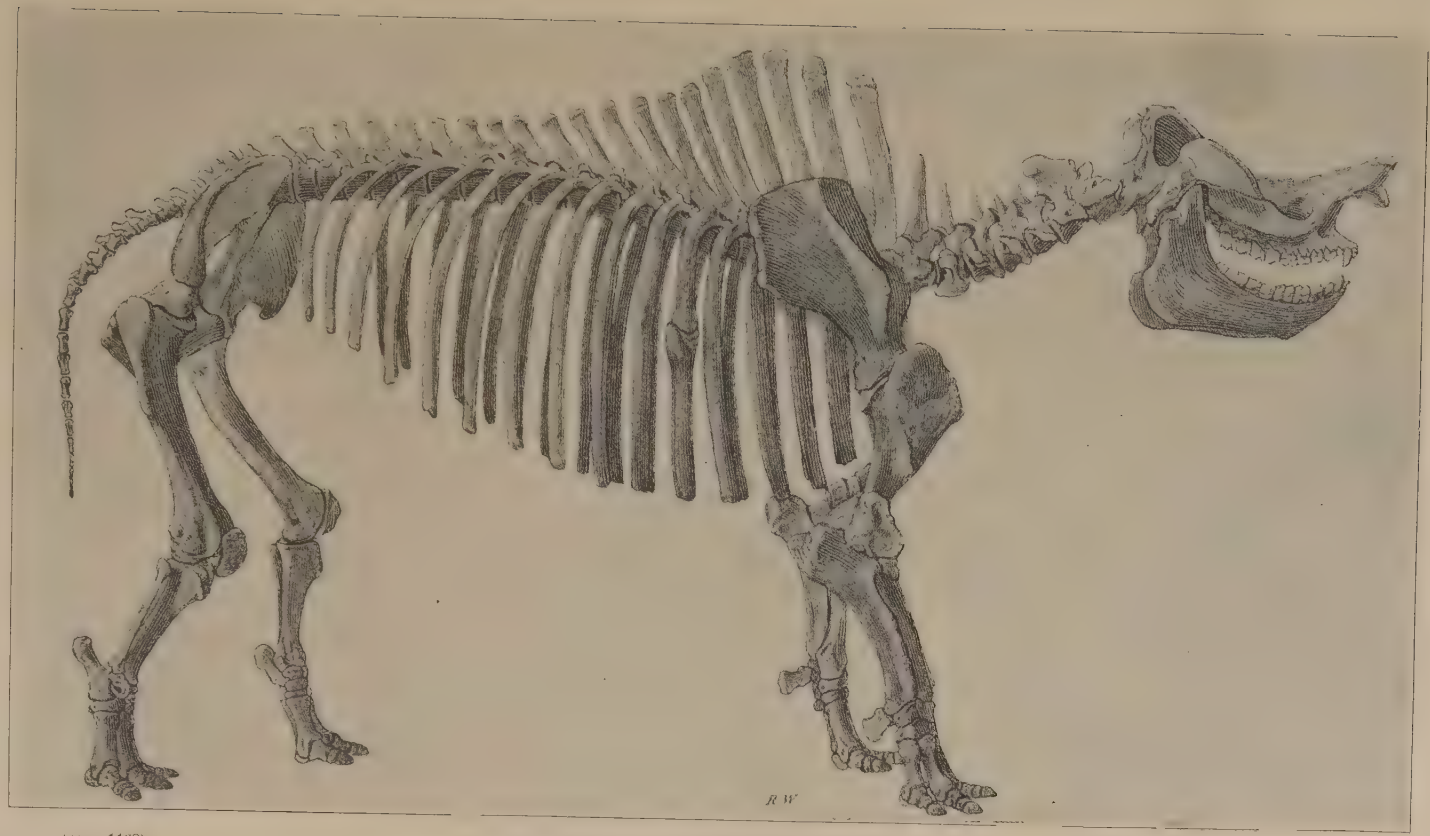
MIOCENE (mī′ō-sēn), a term applied in 1835 by Sir Charles Lyell to the geological beds formerly called Middle Tertiary. It is used to denote that only a minority of the shells belong to recent species, while Pliocene designates the more recent. Miocene deposits contain fossils of mammals, plants, and shells that foreshadow life forms of the present time, and indicate a moderate climate.

MIOSEN (mē-ō′zẹn), the most important lake of Norway, situated thirty-eight miles northeast of Christiania. Near its shore are several railroad towns. It is eight miles wide, sixty miles long, and forms the source of the Vormen River.

MIRABEAU (me-rä-bō′), **Honore Gabriel Riquetti, Comte de**, author and statesman, born at Bignon, near Nemours, France, March 9, 1749; died April 2, 1791. He descended from an ancient Florentine family, whose members were expelled from their native city on account of Ghibelline political affairs in 1268, and whose descendants became prominent in French politics under Louis XIV. and Cardinal Mazarin. His father induced him to join the army, but during leisure moments he utilized his time in prosecuting study in various branches, and showed a disposition to follow a career of sensational relations. Smallpox had scarred his face to a remarkable degree, and he possessed a homeliness that became a power of influence when connected with his personal magnetism and intellectual strength. After serving for some time in the army, he fled with a married woman, but was apprehended and condemned to be executed as a deserter. During an imprisonment of about three years he wrote an essay on state prisons and several works of minor importance. Subsequently he was liberated, and, after spending some time in Holland, returned to France to become a candidate, in 1785, for admission to the national assembly. In the first contest he was defeated, but later was chosen to represent Marseilles, and soon developed a wide influence by superior talents and admirable oratorical powers.

Mirabeau led a strong opposition against the court and the aristocracy, and sought to establish a constitutional monarchy in France. To accomplish these ends he endeavored to make the king head of the Revolutionary party, and afterward sought to form alliances with Necker and Lafayette by suggesting them for the new ministry. Later he also tried to win the queen, but his power was either doubted or his plans distrusted to an extent that made effective operation impossible. In 1790 he became president of the Jacobins, and the following year he was made president of the national assembly. In both these positions he displayed energy and boldness in advocating constitutional rights, and continued to endeavor to guide the Revolution so as to bring about reforms in peaceful ways, but soon after began to decline in mental and physical strength. The remains of Mirabeau were buried in the Pantheon with much pomp. His writings include several excellent works on finance and political economy, and a history of the Prussian monarchy under Frederick the Great. His son, Lucas Montigny, wrote his biography.

MIRABILITE (mĭ-răb′ĭ-lit), a white crystaline substance commonly known as Glauber's salts, valuable as a cathartic. It was first discovered at Carlsbad, Bohemia, by Johann Glauber (1604-68), a German chemist.



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TITANOTHERIUM ROBUSTUM—Fossil of the Miocene Period.